U.S. DEPARTMENT OF TRANSPORTATION

NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION

LABORATORY TEST PROCEDURE

FOR

NEW CAR ASSESSMENT PROGRAM

SIDE IMPACT TESTING

November 2002

RULEMAKING
OFFICE OF CRASHWORTHINESS STANDARDS
ROOM 5307, NVS-110
400 SEVENTH STREET, SW
WASHINGTON, DC 20590

LABORATORY TEST PROCEDURES

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1. PURPOSE AND APPLICATION

The Office of Crashworthiness Standards (OCWS) provides contracted laboratories with Laboratory Test Procedures (TP's) which serve as guidelines for obtaining crash test data. The data are used to support OCWS Consumer information program in providing consumers with comparative crash test information. The purpose of the OCWS Laboratory Test Procedures is to present a uniform testing and data recording format, and provide suggestions for the use of specific equipment and procedures. Any contractor interpreting any part of an OCWS Laboratory Test Procedure to be in conflict with any referenced materials or observing any deficiencies in a Laboratory Test Procedure is required to advise the Contracting Officer's Technical Representative (COTR) and resolve the discrepancy prior to the start of testing.

Contractors are required to submit a detailed test procedure to the COTR before initiating the test program. The procedure must include a step-by-step description of the methodology to be used. The contractor's test procedure shall contain a complete listing of test equipment and a detailed check-off list. There shall be no contradiction between the OCWS laboratory test procedure and the contractor's in-house test procedure. The list of test equipment shall include instrument accuracy and calibration dates.

Contractors are required to supply all equipment and instrumentation necessary to properly conduct vehicle side impact testing according to this test procedure. The Government will furnish the contractor with test vehicles and non-instrumented test dummies. The contractor will be responsible to provide everything else necessary to conduct testing. This will include, but is not limited to, such things as the Moving Deformable Barrier (MDB), Aluminum Honeycomb Barrier Faces, and all instrumentation (including accelerometers) necessary to collect data from the test dummies, MDB and test vehicle.

The OCWS Laboratory Test Procedures are not intended to limit or restrain a contractor from developing or utilizing any testing techniques or equipment which will assist in procuring the required crash test data.

2. GENERAL REQUIREMENTS

The New Car Assessment Program (NCAP) side impact test procedure is based on the FMVSS No. 214D test procedure. Whereas the objective of the FMVSS No.214D is to reduce the risk of serious and fatal injury to occupants of passenger cars in side impact crashes, the primary purpose of NCAP side impact program is to provide consumers with the comparative vehicle side protection information in their vehicle purchase decision. And this will thus provide incentives for vehicle manufacturers to design safer cars.

For all tests under this NCAP side impact test procedure, the contract laboratories are directed to use a special test parameter, which is an impact speed of 61 kph. This is 8 kph greater than the 53 kph impact test speed in the FMVSS No. 214D. This increased speed is specified in order that the NHTSA can obtain new car assessment and research data, and the 61 kph crash test will be viewed as "indicant tests" to the requirements of the FMVSS No. 214D.

3. SECURITY

The contractor shall provide appropriate security measures to protect the OCWS test vehicles, dummies, deformable honeycomb barrier face units and any GFP from unauthorized personnel during the entire testing program. The contractor is financially responsible for any acts of theft and/or vandalism which occur during the storage of test vehicles and deformable honeycomb barrier units. Any security problems which arise shall be reported by telephone to the Industrial Property Manager (IPM), Office of Contracts and Procurement, within two working days after the incident. A letter containing specific details of the security problem will be sent to the IPM (with copy to the COTR) within 48 hours.

The contractor shall protect and segregate the data that evolves from testing before and after each vehicle test. No information concerning the vehicle testing program shall be released to anyone except the COTR, unless specifically authorized by the COTR or the COTR's Branch or Division Chief.

The tested vehicles and tested honeycomb barrier faces, protected from the elements, shall be retained by the test contractor for a MINIMUM of 60 days so that OCWS personnel can be given an inspection opportunity.

NO INDIVIDUALS, OTHER THAN CONTRACTOR PERSONNEL DIRECTLY INVOLVED IN THE TESTING PROGRAM, SHALL BE ALLOWED TO WITNESS ANY OCWS VEHICLE TEST UNLESS SPECIFICALLY AUTHORIZED BY THE COTR. IT IS THE CONTRACTOR'S RESPONSIBILITY TO SECURE THE TEST SITE AREA DURING A TEST AND TO SHIELD THE IMPACT AREA FROM THE PUBLIC VIEW BY THE USE OF CANVAS OR OTHER BLOCKING DEVICES.

Rules for Contractors

I. No vehicle manufacturer's representative(s) or anyone other than the contractor's personnel working on the OCWS Contracts and NHTSA personnel, shall be allowed to inspect OCWS vehicles or witness vehicle preparations without prior permission of the Office of Crashworthiness Standards (OCWS). Such permission can never be assumed.

II. All communications with vehicle manufacturers shall be referred to the OCWS. The contractor shall not release crash test data without the permission of the OCWS.

III. Unless otherwise specified, the vehicle manufacturer's representative(s) shall only be authorized to visit the contractor's test facility on the day that the test is scheduled, and the representative(s) must be escorted by OCWS and/or contractor personnel.

IV. Test vehicle inspection by the vehicle manufacturer's representative(s) shall be limited to 30 minutes prior to the start of vehicle impact test. Post test inspection shall be limited to 1 hour after contractor personnel have completed their test tasks.

V. Photographs and videotapes of the test vehicle, associated test equipment and test event shall be allowed. However, test personnel shall not be included in any photographic coverage, and videotaping of vehicle preparation must be approved by OCWS. The contractor's personnel shall not respond to any questions from the manufacturer's representatives regarding the OCWS test. All questions shall be referred to the COTR, an OCWS representative present at the test site, or to OCWS.

VI. The contractor shall permit public access to and inspection of the test vehicles and related data during the times specified by the OCWS COTR. OCWS shall advise interested parties that such access and inspection shall be limited to a specified day, and specified hours and require prior approval from the Office of Crashworthiness Standards. The contractor shall refer all visit requests from vehicle manufacturer's representatives to the Office of Crashworthiness Standards. This service shall be included as an incidental part of the crash test program and will not result in any additional cost to the OCWS. The contractor shall make his own arrangements with interested parties for expenses incurred beyond providing access and inspection services.

4. GOOD HOUSEKEEPING

Contractors shall maintain the entire vehicle testing area, dummy calibration area, test fixtures and instrumentation in a neat, clean and painted condition with test instruments arranged in an orderly manner consistent with good test laboratory housekeeping practices.

5. TEST SCHEDULING AND MONITORING

The contractor shall submit a test schedule to the COTR prior to testing. Tests shall be completed as required in the contract. The COTR will make adjustments to the crash test schedule in cases of unusual circumstances such as inclement weather or difficulty experienced by the Agency in the procurement of a particular vehicle make and model. Scheduling shall be adjusted to permit the agency's other sample motor vehicles to be tested as may be required by the OCWS. All testing shall be coordinated to allow monitoring by the COTR.

6. FACILITY AND EQUIPMENT - PRETEST REQUIREMENTS

6.1 SIDE IMPACT TEST SURFACE

The path of the target vehicle after being struck by the Moving Deformable Barrier (MDB) must be taken into consideration when determining an adequate smooth flat concrete area for the side impact test surface. All four wheels of the test passenger car and all four wheels of the MDB must fall in the same plane, and shall remain in the side impact testing surface area. The COTR should be notified and give prior approval if the test surface is configured such that one or more of the vehicles tires will contact a surface that is not concrete during the test.

6.2 TOW ROAD

The tow road surface must be straight, level, smooth and uniform construction. The tow road must have sufficient length to allow for stabilization of the MDB velocity (zero acceleration) prior to side impact with the test vehicle, and to allow time for the MDB to be stopped from test speed of 61.9 kph ± 0.8 kph in case of a test abort.

6.3 TEST VEHICLE PREPARATION BUILDING (applies to labs with out-door impact surfaces)

In order that the test vehicle can be prepared for side impact testing during hot or cold weather, a permanent wood or metal enclosure must be constructed which is large enough to house the test vehicle and allow for personnel movement around the test vehicle. The temperature inside of the test vehicle must be maintained between 18.9°C and 25.5°C for a minimum of four (4) hours prior to the side impact event. The test dummies shall be allowed to soak for 24 hours (in a controlled environment of 18.9°C to 25.5°C) prior to placement in test vehicle. The preparation enclosure must be removed prior to conducting the side impact test.

6. FACILITY AND EQUIPMENT - PRETEST REQUIREMENTS....Continued

6.4 MOVING DEFORMABLE BARRIER (MDB)

The contractor shall provide a moving deformable barrier (see **Figure 1**) as specified in FMVSS No. 214. A summary of MDB & honeycomb face details are provided as follows:

A. Total weight of MDB with impact face (for compliance purposes) shall be 1,361 ± 4.5 kg [1,356.5 - 1,365.5] (configured MDB weight of 1,367.6 kg stated in P587.6(c) of the rule.

B. Overall length of MDB with impact face = 4,115 ± 25 mm

C. Overall length of MDB excluding impact face = 3,632 mm (includes 50.8 mm thick mounting block)

D. Overall width of framework carriage = 1,251 mm

E. Tracking width (centerline to centerline of front or rear wheels) = 1,880 mm

F. Wheelbase for framework carriage = 2,591 ± 25 mm

G. Inertial properties of the MDB (with two cameras and camera mounts and a light trap vane and ballast reduced); the center of gravity (CG) is as follows:

X = (1,123 ± 25) mm rear of front axle

Y = (7.6 ± 25) mm left of longitudinal centerline

Z = (500 ± 25) mm from ground

Moments of inertia (tolerance 5% for testing purposes) are as follows:

Pitch = 2,263 kg-m^2

Roll = 508 kg-m^2

Yaw = 2,572 kg-m^2

H. Shape of honeycomb impact face

Width = 1,676 ± 6 mm

Height = 559 ± 6 mm

Ground Clearance = 279 ± 3 mm

6. FACILITY AND EQUIPMENT - PRETEST REQUIREMENTS....Continued

Depth at Bumper Height = 483 ± 6 mm

Depth at upper impact face = 381 ± 6 mm

I. Force-deflection properties (crush strength) for honeycomb impact face shall be 310 ± 17 kpa and 1,690 ± 103 kpa for the bumper.

J. Position of four wheels on framework carriage = (27 ± 1) degrees

All Measurements in millimeters

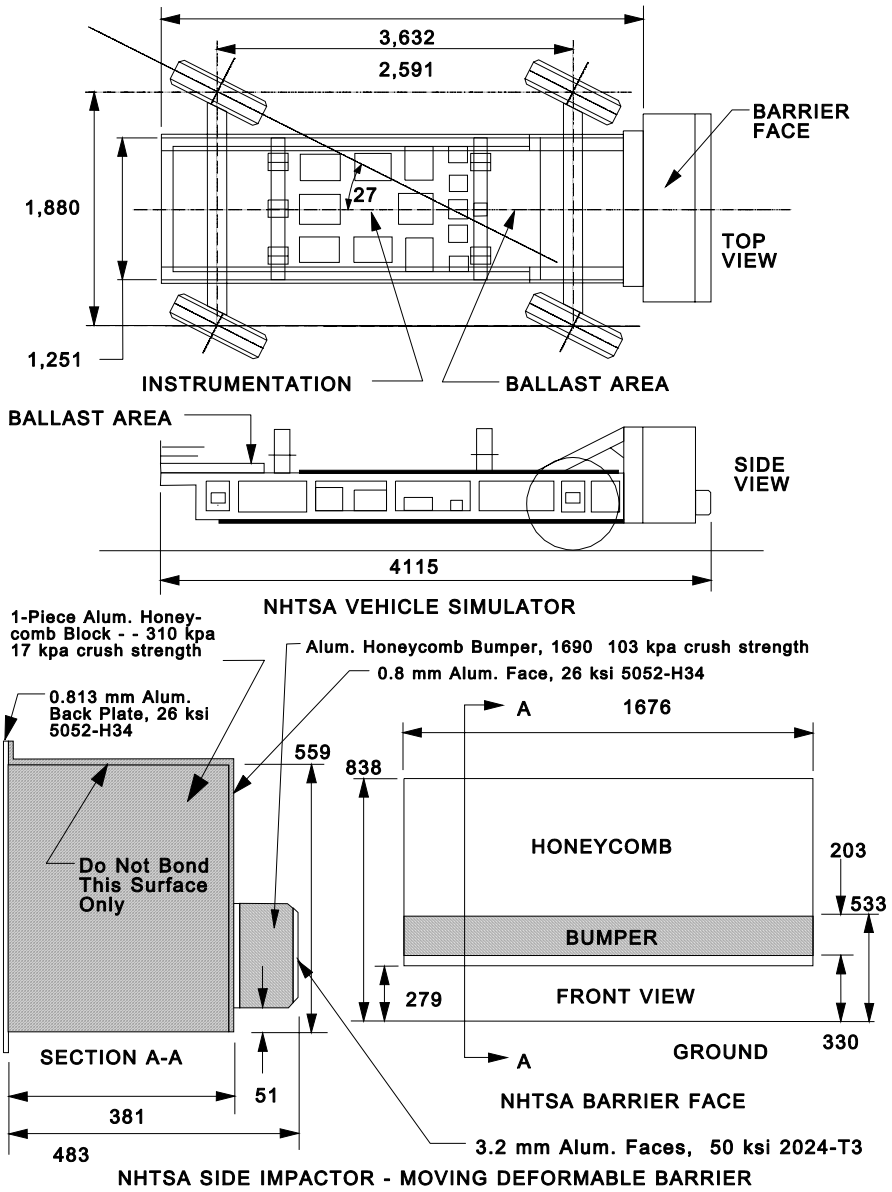


FIGURE 1

6. FACILITY AND EQUIPMENT - PRETEST REQUIREMENTS....Continued

6.5 TOW AND GUIDANCE SYSTEM

The tow system must be capable of ensuring that the Moving Deformable Barrier (MDB) shall impact the test vehicle at a speed of **61.9 ± 0.8 kph.** The MDB shall be continuously towed up until 305 mm from impact (tolerance window of 610 mm to 152 mm). The tow cable attachment device must release from the tow cable within the tolerance window. The MDB velocity measurement shall be taken after cable release.

The cable attaching the MDB to the tow system shall be made from steel cable. The length of this cable shall not change significantly (± 25 mm) from test to test.

A lateral guidance system is required to assure that the MDB shall impact the side of the target or test vehicle at the designated angle even though the MDB is crabbed to an angle of 27 ± 1 degrees with the forward line of motion. It must also assure that the MDB impact the test vehicle within ± 50 mm of the vertical reference line, as specified in the standard.

VERTICAL IMPACT LINE

For passenger vehicles, the vertical impact reference line shown in (**figure 2**) is 940 mm ± 5 mm forward of the center of the test vehicles wheelbase when the test vehicle's wheelbase ≤ 2,896 mm. If the wheelbase is greater than 2,896 mm, then the vertical impact reference line is 508 mm ± 5 mm rearward of the test vehicle's front axle centerline.

For multipurpose vehicles (sport utility vehicles), light trucks, and vans, when the test vehicle's wheelbase is ≤ 2,489 mm, the vertical impact line is 305 mm ± 5 mm rearward of the centerline of the test vehicles front axle. If the wheelbase is greater than 2,489 mm but less than 2,896 mm, then the vertical impact reference line is 940 mm ± 5 mm forward of the test vehicle's wheelbase centerline. If greater than 2,896 mm then the vertical impact line is 508 mm ± 5mm rearward of the test vehicle's wheelbase centerline.

NOTE: For different wheelbase versions of the same model vehicle the impact reference point may be found (at the manufacturers option) by the following: Select the shortest wheelbase vehicle of the different versions of the same model and locate on it the impact reference line as described above. Measure the distance between the seating reference point and the impact reference line. Maintain the same distance between the seating reference point and the impact reference line for the shortest wheelbase version of the model.

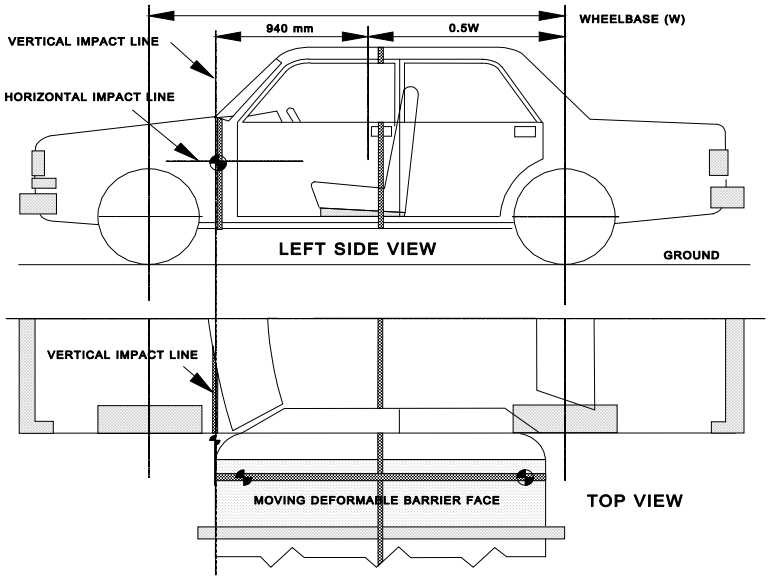


FIGURE 2

6. FACILITY AND EQUIPMENT - PRETEST REQUIREMENTS....Continued

HORIZONTAL IMPACT LINE

The tow system shall be designed so that the MDB may consistently impact the target vehicle within ± 20 mm of the ideal horizontal impact line. See Section 11.4 for more details.

6.6 MOVING DEFORMABLE BARRIER (MDB) VELOCITY MEASUREMENT

The MDB shall impact the side of the target or test vehicle at the predetermined speed and the MDB's velocity shall be approximately constant (zero acceleration) for the last 1.5 meters of crabbed forward motion before impact. The final velocity shall be measured after tow system release within 150 mm of impact (release window tolerance is 610 mm to 150 mm). The reported impact velocity shall take into consideration all of the response characteristics of the entire velocity measurement system utilized in its determination.

Impact velocity shall be measured by no less than two sets of timing devices such as photocells, break wires, laser beams, etc., and the timing devices shall be accurate to within ± 0.08 kph and be calibrated by an instrument traceable to the National Institute of Standards and Technology. Recorded values in these timing devices shall be permanently documented on film or photo.

6.7 MOVING DEFORMABLE BARRIER (MDB) BRAKE ABORT SYSTEM

The MDB shall be equipped with an onboard brake abort system. Abort criteria consists of MDB velocity, data acquisition and instrumentation system readiness, and stability of the MDB on the tow road. It is recommended that the first two criteria are to be automatically monitored by the test control system while the third is manually monitored by the test director. For added safety, a manual abort shall be available from start, until the point at which the MDB is impossible to stop without impacting the test vehicle.

6.8 ALUMINUM HONEYCOMB BARRIER FACE UNITS

The contractor has the responsibility of procuring certified aluminum honeycomb barrier face units from the honeycomb manufacture which meet the crush strength specifications required by the standard. Each honeycomb barrier will be used for only one test, thus the contractor shall procure one barrier face for each vehicle being tested plus one extra barrier face in case something unexpectedly happens to a barrier face. The contractor shall conduct detailed inspection of the honeycomb barrier for shipping damage. The contractor shall retain a copy of the barrier manufacturers test data used to certify the barrier face and make it available for review by the COTR. This shall consist of certification information for the 310 and 1,690 kpa barrier face portions. The contractor shall have the equipment or access to equipment that will allow them to test honeycomb samples according to the test procedure called out in **Appendix VI** "Aluminum Honeycomb Crush Strength Certification", to ensure the samples provided meet the requirements of the standard. See Page 1 of **Appendix VI** for more details.

6.9 NOTIFICATION OF COTR

The COTR must be notified within 24 hours after a test vehicle or a group of certified aluminum honeycomb face units have been delivered.

NOTE: The tested vehicles and tested honeycomb barrier faces, protected from the elements, shall be retained by the test contractor for a MINIMUM of 60 days so that OCWS personnel can be given an inspection opportunity.

7. GOVERNMENT FURNISHED PROPERTY (GFP)

7.1 TEST VEHICLES

The Contractor has the responsibility of accepting test vehicles from either new car dealers or vehicle transporters. In both instances, the contractor acts in the OCWS's behalf when signing an acceptance of test vehicles. If a vehicle is delivered by a dealer, the contractor must check to verify the following:

A. All options listed on the 'window sticker' are present on the test vehicle.

B. Tires and wheel rims are the same as listed.

C. There are no dents or other interior or exterior flaws.

D. The vehicle has been properly prepared and is in running condition.

E. The glove box contains an owner's manual, warranty document, consumer information, and extra set of keys.

F. Proper fuel filler cap is supplied on the test vehicle.

G. Spare tire, jack, lug wrench and tool kit (if applicable) is located in the vehicle cargo area.

The Contractor shall check for damage which may have occurred during transit. The COTR is to be notified of any damage prior to preparation of the vehicle for testing.

A 'Vehicle Condition' form (refer to section 15) will be supplied to the contractor by the COTR when the test vehicle is transferred from the new car dealer or between test contracts. The upper half of the form describes the vehicle in detail, and the lower half provides space for a detailed description of the post test condition. Vehicle Condition forms must be returned to the COTR with the copies of the Final Test Report or the reports will NOT be accepted.

7.2 TEST DUMMIES

An adequate number of **non-instrumented** Part 572 Subpart F side impact test dummies (SIDs) and Part 572 Subpart M side impact dummies with hybrid three head and neck (SID/H3) will be furnished to the contract laboratory by the OCWS. The dummies shall be stored in an upright, seated position with the weight supported by the internal structure of the pelvis. The dummy's head shall be held upright without supporting the weight of the dummy by using an eye bolt that can be secured in the top of the head. These dummies shall be stored in a secured room which is kept between 12.8°C and 29.4°C. The Contractor will check the dummy components for damage when performing the calibrations. The COTR will be kept informed of the dummies condition in order that replacement parts can be provided. The contractor shall keep a detailed record for each test dummy, describing parts replaced and the results of calibration tests. The government has the option to choose either the SID or the SID/H3 test dummy to use in a particular case, as determined by the COTR.

8. INSTRUMENTATION AND CALIBRATION REQUIREMENTS

8.1 GENERAL REQUIREMENTS

Before the Contractor initiates the OCWS test program, a test instrumentation calibration system will be implemented and maintained in accordance with established calibration practices. Guidelines for setting up and maintaining such calibration systems are described in MIL-C-45662A, "Calibration System Requirements". The calibration system shall be set up and maintained as follows:

A. Standards for calibrating the measuring and test equipment will be stored and used under appropriate environmental conditions to assure their accuracy and stability.

B. All measuring instruments and standards shall be calibrated by the contractor, or a commercial facility, against a higher order standard at periodic intervals not to exceed **twelve (12) months for the calibration standards**. Records, showing the calibration traceability to the National Institute of Standards and Technology (NIST), shall be maintained for all measuring and test equipment.

C. All measuring and test equipment and measuring standards will be labeled with the following information:

(1) Date of calibration
(2) Date of next scheduled calibration
(3) Name of the technician who calibrated the equipment

D. A written calibration procedure shall be provided by the Contractor which includes as a minimum the following information for all measurement and test equipment:

(1) Type of equipment, manufacturer, model number, etc.
(2) Measurement range
(3) Accuracy
(4) Calibration interval
(5) Type of standard used to calibrate the equipment (calibration traceability of the standard must be evident)

E. Records of calibration for all test instrumentation shall be kept by the contractor in a manner which assures the maintenance of established calibration schedules. All such records shall be readily available for inspection when requested by the COTR and shall be included in the Final Test Report. The calibration system will need the acceptance of the COTR before testing commences.

F. The Contractor Furnished data acquisition and processing system for recording signals from test dummies and vehicle sensors in vehicle test shall be qualified by performing the qualification test as specified in **APPENDIX V**, "Data Acquisition System Qualification Requirements and Test Procedure."

NOTE: In the event of a test failure (i.e. failure to meet FMVSS No. 214D performance requirements) or data anomaly, additional calibration checks of some critically sensitive test equipment and instrumentation may be required. The necessity for the calibration will be at the COTR's discretion and will be performed without additional cost.

8.2 TEST DUMMY INSTRUMENTATION

The full vehicle test concept requires the use of human surrogates to determine the injury levels listed above. The Part 572 Subpart F Side Impact Dummy (SID) and the Part 572 Subpart M Side Impact Dummy with Hybrid three head and neck (SID/H3) have been chosen as appropriate Anthropomorphic Testing Devices (ATD).

The SID and SID/H3 are designed for lateral impacts. The basic design for the SID is derived from the Part 572 B dummy with a redesigned chest assembly and without arms. The chest assembly consists of 5 ribs with ballast plates to compensate for the arm weight. A hydraulic piston (damper) is laterally oriented between the ribs and spine on the struck side. The basic design for the SID/H3 is derived from the Part 572 F and the Part 572 E dummy. The dummy is similar to the SID with the exception of an instrumented head and neck. The SID and SID/H3 are generally configured for left side impact. For a right side impact, the damper must be rotated 180 degrees from the configured orientation. The test vehicle may be impacted on either side. The COTR will decide whether the test should be conducted on the left or right side.

For the SID and the SID/H3, the head will be instrumented with head accelerometers for HIC values. The head accelerometer will be either tri-axis accelerometer or the 9-acc accelerometer and the chest shall be instrumented with **Endevco Model 7264-2000g** uniaxial accelerometers (configured for Y axis sensitivity according to impact condition, redundant accelerometers are required and their locations are clearly indicated in the SID Users Manual) located in the following positions for a left side impact (see **Figures 3 thru 5** on following pages):

A. Left Upper Rib (LUR)

B. Left Lower Rib (LLR)

C. Lower Spine (T_{12})

D. Pelvis Assembly (PEV)

F. Head accelerometer. For the SID/H3, Head accelerometers and Neck load cells should be installed, see Appendices I, II, VII and VIII.

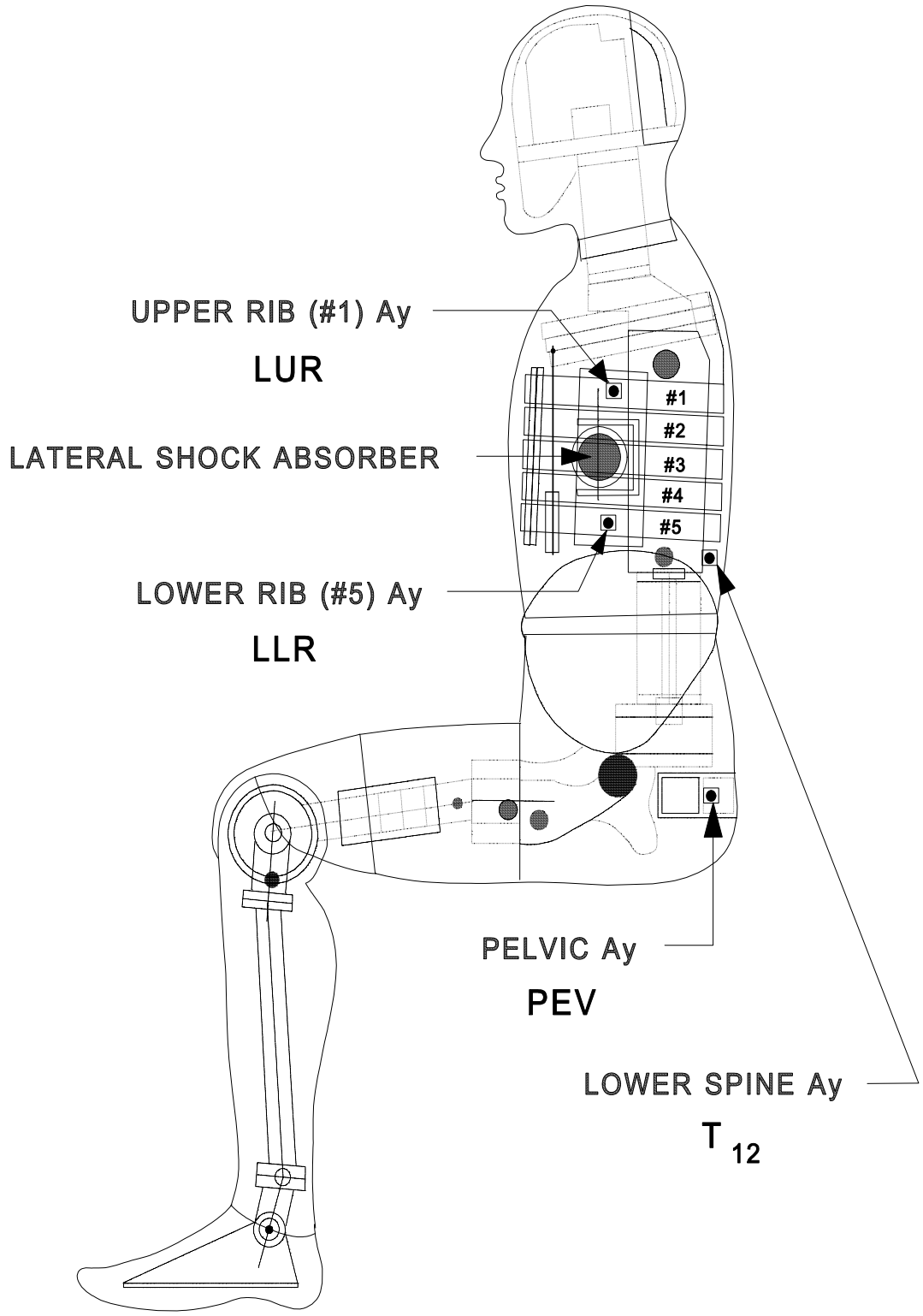

UPPER RIB (#1) Ay
LUR
LATERAL SHOCK ABSORBER
LOWER RIB (#5) Ay
LLR
PELVIC Ay
PEV
LOWER SPINE Ay
T 12
#1
#2
#3
#4
#5

FIGURE 3

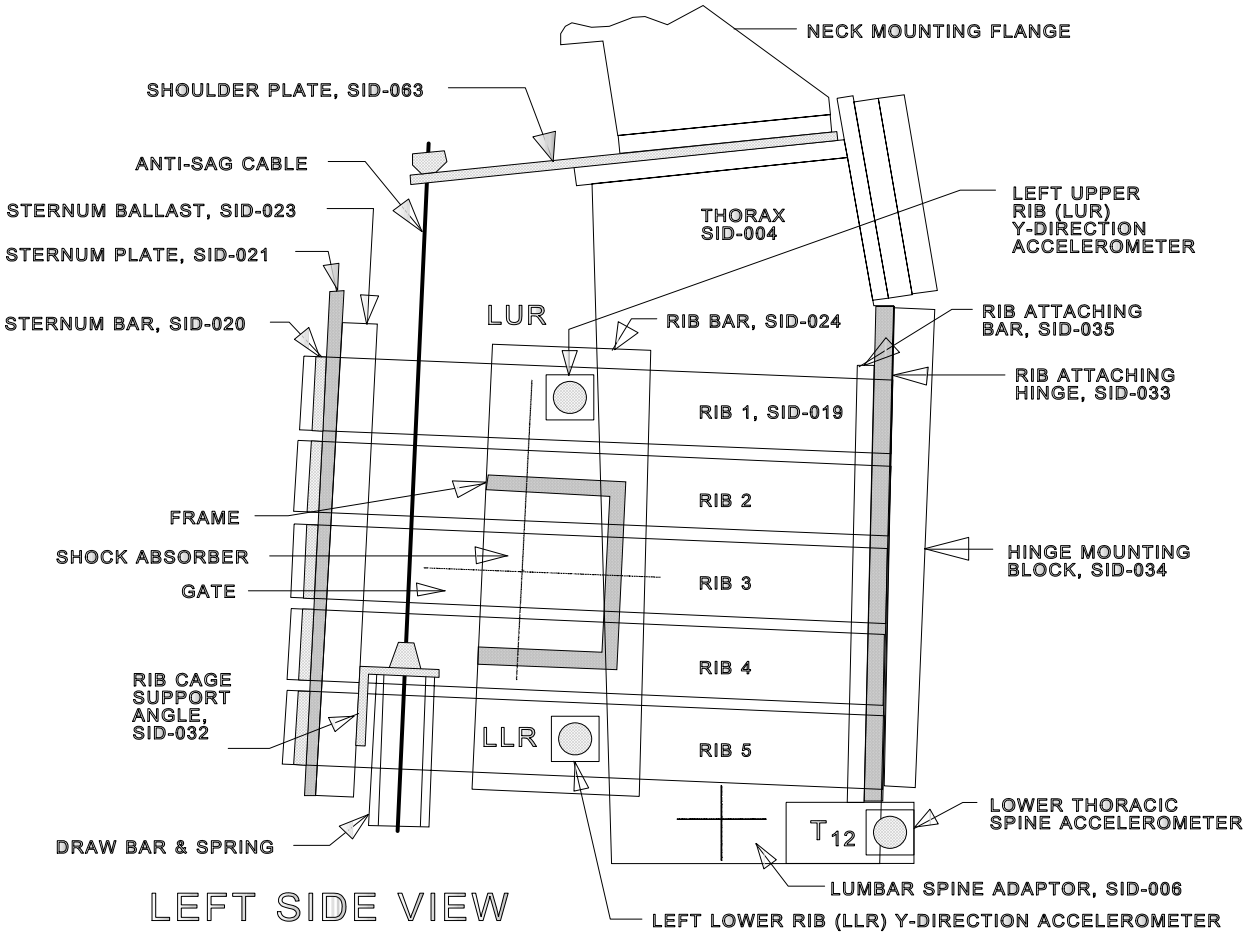

NECK MOUNTING FLANGE
SHOULDER PLATE, SID-063
ANTI-SAG CABLE
STERNUM BALLAST, SID-023
STERNUM PLATE, SID-021
STERNUM BAR, SID-020
THORAX
SID-004
LEFT UPPER
RIB (LUR)
Y-DIRECTION
ACCELEROMETER
LUR
RIB BAR, SID-024
RIB ATTACHING
BAR, SID-035
RIB ATTACHING
HINGE, SID-033
RIB 1, SID-019
RIB 2
FRAME
SHOCK ABSORBER
GATE
HINGE MOUNTING
BLOCK, SID-034
RIB 3
RIB 4
RIB CAGE
SUPPORT
ANGLE,
SID-032
LLR
RIB 5
T12
LOWER THORACIC
SPINE ACCELEROMETER
DRAW BAR & SPRING
LUMBAR SPINE ADAPTOR, SID-006
LEFT SIDE VIEW
LEFT LOWER RIB (LLR) Y-DIRECTION ACCELEROMETER

FIGURE 4

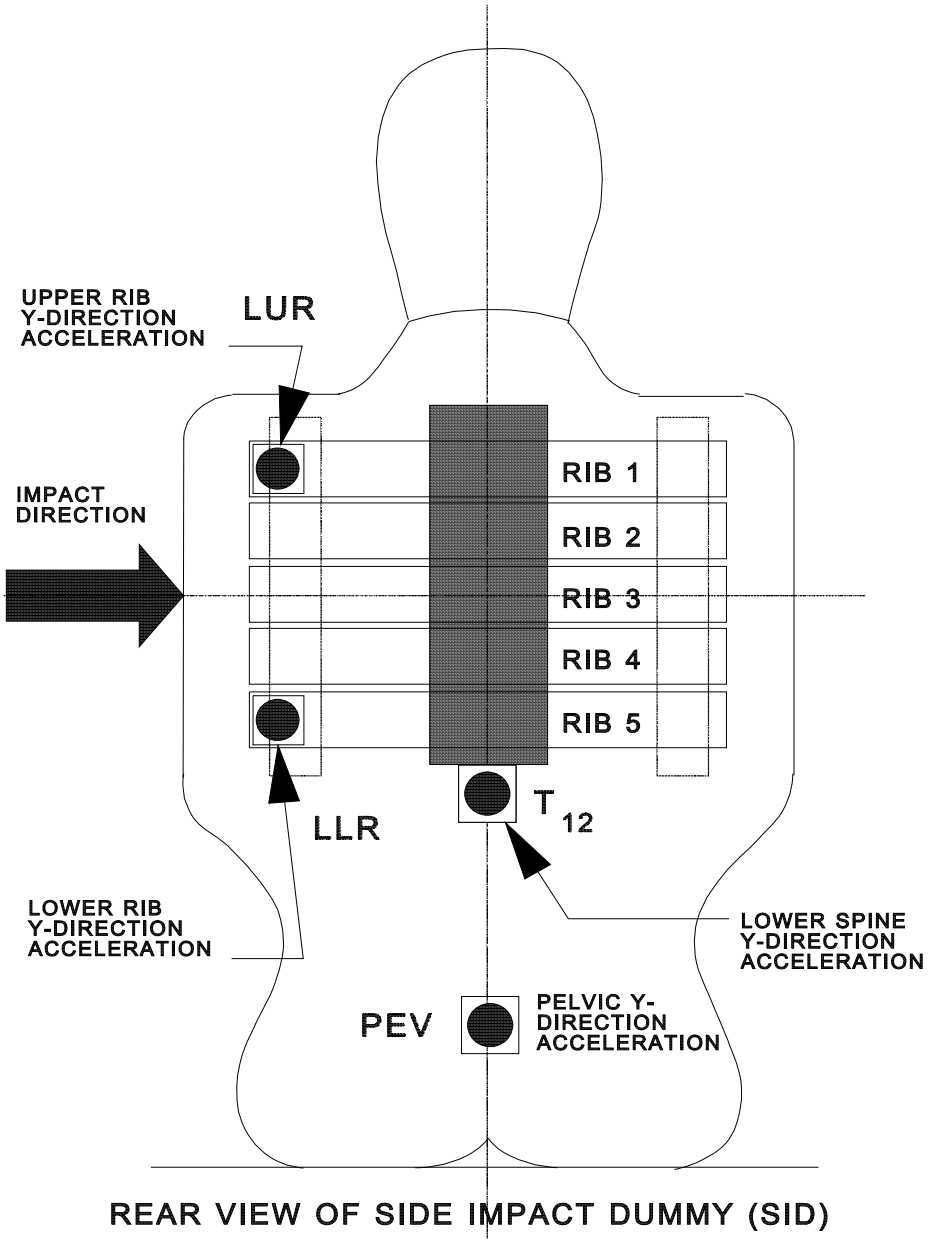

UPPER RIB
Y-DIRECTION
ACCELERATION
LUR
IMPACT
DIRECTION
RIB 1
RIB 2
RIB 3
RIB 4
RIB 5
LLR
T 12
LOWER RIB
Y-DIRECTION
ACCELERATION
LOWER SPINE
Y-DIRECTION
ACCELERATION
PEV
PELVIC Y-
DIRECTION
ACCELERATION
REAR VIEW OF SIDE IMPACT DUMMY (SID)

FIGURE 5

8. INSTRUMENTATION AND CALIBRATION REQUIREMENTS....Continued

8.3 SIDE IMPACT DUMMY (SID) CALIBRATION

Dummy Configuration and Performance Verification Testing

All GFE Part 572 F test dummies shall be calibrated (pre and post-test) by the contractor ON-SITE using the procedures found in **APPENDIX I and APPENDIX** II.

All calibration data shall be recorded on the data sheets provided and submitted with the Final Test Report as outlined in **section 13** of this test procedure.

The test dummies shall be clothed with form fitting cotton mid-calf length pants and short sleeve shirts during the calibration test and also during the NCAP test.

NOTE: The SID and SID/H3 shock absorber shall be calibrated prior to initiating the test program. It is not necessary to calibrate the shock absorber after every impact, but it shall be calibrated after 5 exposures or in the event there is a problem with obtaining acceptable calibration data for the upper or lower ribs.

8. INSTRUMENTATION AND CALIBRATION REQUIREMENTS....Continued

8.4 DRAWING LIST FOR SIDE IMPACT DUMMY (SID)

In addition to the Part 572B drawings, OCWS COTR will provide the contractor, upon request, any or all of the following SID drawings. For SID/H3 part list see **APPENDIX III**.

SID-002 - Lumbar (Molded)
SID-003 - Lumbar Flange
SID-004 - Thoracic Assembly
SID-005 - Thorax to Lumbar Adaptor Assembly
SID-006 - Lumbar Adaptor
SID-007 - Thorax Assembly Bottom Plate
SID-008 - Thorax Assembly Bottom Plate Locator
SID-009 - Lower Thoracic Spine Accelerometer (T_{12}) Mounting Platform
SID-010 - Thorax Assembly Side Plate
SID-011 - Thorax Assembly Front Block
SID-012 - Thorax Assembly Back Block
SID-013 - Thorax Assembly Top Plate
SID-014 - Upper Thoracic Spine Accelerometer (T_1) Base Plate
SID-015 - Front Partition Plate --DELETED
SID-016 - Rear Partition Plate --DELETED
SID-017 - Side Plate Tapping Block -- DELETED
SID-018 - Side Impact Rib Assembly
SID-019 - Side Impact Rib (Steel Portion)
SID-020 - Sternum Center Bar
SID-021 - Sternum Plate (Urethane)
SID-022 - Top and Bottom Sternum Bar
SID-023 - Sternum Ballast
SID-024 - Rib Bar
SID-025 - Front Rib Ballast
SID-026 - Rear Rib Ballast
SID-027 - Rib Bar Right Side Ballast
SID-028 - Rib Bar Left Side Ballast
SID-029 - Rib Ballast Cushion
SID-030 - Rib Reinforcement
SID-031 - Sternum Ballast Upper and Lower Washer Bar
SID-032 - Rib Cage Support Angle
SID-033 - Rib Attaching Hinge
SID-034 - Hinge Mounting Block
SID-035 - Rib Cage to Hinge Bar
SID-036 - Upper Thoracic Spine Accelerometer (T_1) Plate
SID-037 - Upper Thoracic Spine Accelerometer (T_1) Mount
SID-038 - Lower Thoracic Spine Accelerometer (T_{12}) Mount
SID-039 - Lower Thoracic Spine Accelerometer (T_{12}) Cover
SID-040 - Rib Wrap Assembly
SID-041 - Outer Rib Pad
SID-042 - Inner Rib Pad

8. INSTRUMENTATION AND CALIBRATION REQUIREMENTS....Continued

SID-043 - Rib Bar Washer Strip
SID-046 - Anti-bottoming Pad Spacer -- DELETED
SID-047 - Rib Routing Tube -- DELETED
SID-048 - Upper Thoracic Spine Accelerometer (T_1) Routing Tube --DELETED
SID-049 - Lower Thoracic Spine Accelerometer (T_{12}) Routing Tube --DELETED
SID-050 - Middle Shoulder Foam
SID-051 - Upper Shoulder Foam
SID-052 - Lower Shoulder Foam
SID-053 - Rib Cage General Layout
SID-054 - Shock Absorber (Damper) Gate
SID-055 - Shock Absorber (Damper) Pivot Pin
SID-056 - Shock Absorber Mounting Frame
SID-057 - Shock Absorber Support Angle
SID-058 - Shock absorber Mount Nylon Washers
SID-059 - Potentiometer Mounting Bracket and Ring -- OPTIONAL
SID-060 - Shock Absorber Cap and Rod End -- DELETED
SID-061 - Shock Absorber to Rib Bar Attaching Shaft and Spacer
SID-062 - Shock Absorber to Rib Bar Attaching Clevis
SID-063 - Shoulder Plate
SID-064 - Rib Cage Support Details
SID-065 - Outer Skin Zipper Assembly
SID-066 - Outer Skin
SID-067 - Front Zipper Assembly
SID-068 - Rear Zipper Assembly
SID-069 - Arm Foam
SID-070 - Tapered Socket Head Bolt Listing
SID-071 - Socket Head Bolt Listing
SID-072 - Flat Head Socket Bolt Listing
SID-073 - Machine Screw Listing
SID-074 - Hex Nut Listing
SID-075 - Washer Listing
SID-076 - Lower Rib Bar Accelerometer Mount --DELETED
SID-077 - Shock Absorber Rod End
SID-078 - Upper Knee Post
SID-079 - Lower Knee Post
SID-081 - DELETED
SID-082 - DELETED
SID-083 - Thoracic Shock Absorber Test Procedure and Specifications
SID-084 - Rib Ballast Nut Plate
SID-085 - Rib Bar Cushion
SID-086 - DELETED
SID-087 - Pelvis Structure and Flesh Assembly (2 Pages)
SID-088 - Lumbar Pelvic Adaptor
SID-089 - Linear Potentiometer -- OPTIONAL
SID-090 - SID Pelvic Accelerometer-- Mount

8. INSTRUMENTATION AND CALIBRATION REQUIREMENTS....Continued

8.5 TEST VEHICLE INSTRUMENTATION

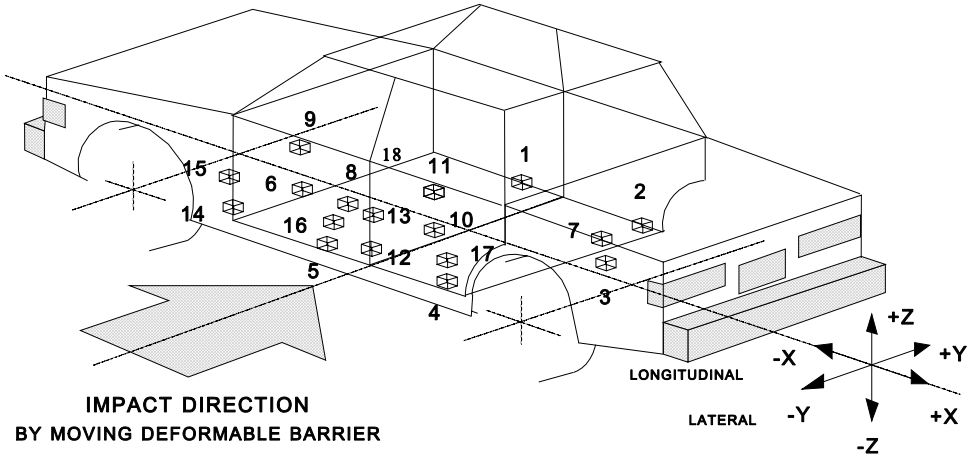


FIGURE 6

The following accelerometers shall be attached to the test vehicle (see **Figure 6** above).

#1 Triaxial accelerometer mounted on the opposite side to the impacted side sill at the front seat to provide Ax, Ay and Az data.

#2 Triaxial accelerometer mounted on the opposite side to the impacted side sill at the rear seat to provide Ax, Ay and Az data.

#3 Triaxial accelerometer mounted on the rear floorpan above the axle to provide Ax, Ay and Az data.

#4 Uniaxial accelerometer mounted on the impacted side sill in line longitudinally with the center of the widest portion of the rear door and located under the sill inward of pinch welds to provide Ay data.

#5 Uniaxial accelerometer mounted on the impacted side sill in line longitudinally with the center of the widest portion of the front door and located under the sill inward of pinch welds to provide Ay data.

#6* Uniaxial accelerometer mounted on the impacted front door on the centerline and approximately 430 mm above the ground to provide Ay data.

#7 Uniaxial accelerometer mounted in the rear occupant compartment to provide Ay data.

#8* Uniaxial accelerometer mounted mid-rear of the impacted front door and 430 mm above the ground to provide Ay data.

#9* Uniaxial accelerometer mounted on the impacted front door upper centerline and approximately 685 mm above the ground to provide Ay data.

8. INSTRUMENTATION AND CALIBRATION REQUIREMENTS....Continued

#10* Uniaxial accelerometer mounted mid-rear of the impacted rear door and approximately 685 mm above the ground to provide Ay data.

#11* Uniaxial accelerometer mounted on the impacted rear door upper centerline approximately 685 mm above the ground to provide Ay data.

#12 Uniaxial accelerometer mounted on the impacted lower B-Post (located 1/3 the distance from the floor to the bottom of the doors window opening) to provide Ay data.

#13 Uniaxial accelerometer mounted on the impacted middle B-Post (located 2/3 the distance from the floor to the bottom of the doors window opening) to provide Ay data.

#14 Uniaxial accelerometer mounted on the impacted lower A-Post (located 1/3 the distance from the floor to the bottom of the doors window opening) to provide Ay data.

#15 Uniaxial accelerometer mounted on the impacted middle A-Post (located 2/3 the distance from the floor to the bottom of the doors window opening) to provide Ay data.

#16 Uniaxial accelerometer mounted on the front seat track nearest the impacted door and approximately aligned with the dummy's H-point to provide Ay data.

#17 Uniaxial accelerometer mounted on the rear seat structure (if easily accessible) nearest the impacted door and approximately aligned with the dummy's H-point to provide Ay data.

#18 Triaxial Accelerometer mounted on the floor at the vehicle CG to collect Ax, Ay, and Az data.

NOTE: Installation of these accelerometers (6, 8, 9, 10, 11) shall follow instructions provided by vehicle manufacturers. Otherwise, consult with COTR for direction and final decision.

8. INSTRUMENTATION AND CALIBRATION REQUIREMENTS....Continued

8.6 MOVING DEFORMABLE BARRIER (MDB) INSTRUMENTATION

A. The following accelerometers mounted at the MDB's center of gravity to provide Ax, Ay and Az data -- refer to **Figure 7** below.

B. Bi-axial accelerometers shall be mounted on the left side of the frame member along the rear axle centerline to provide Ax and Ay data.

C. Contact switches shall be installed on the right and left side of the MDB honeycomb Bumper. Note these two switches are in addition to the one installed on the test vehicle.

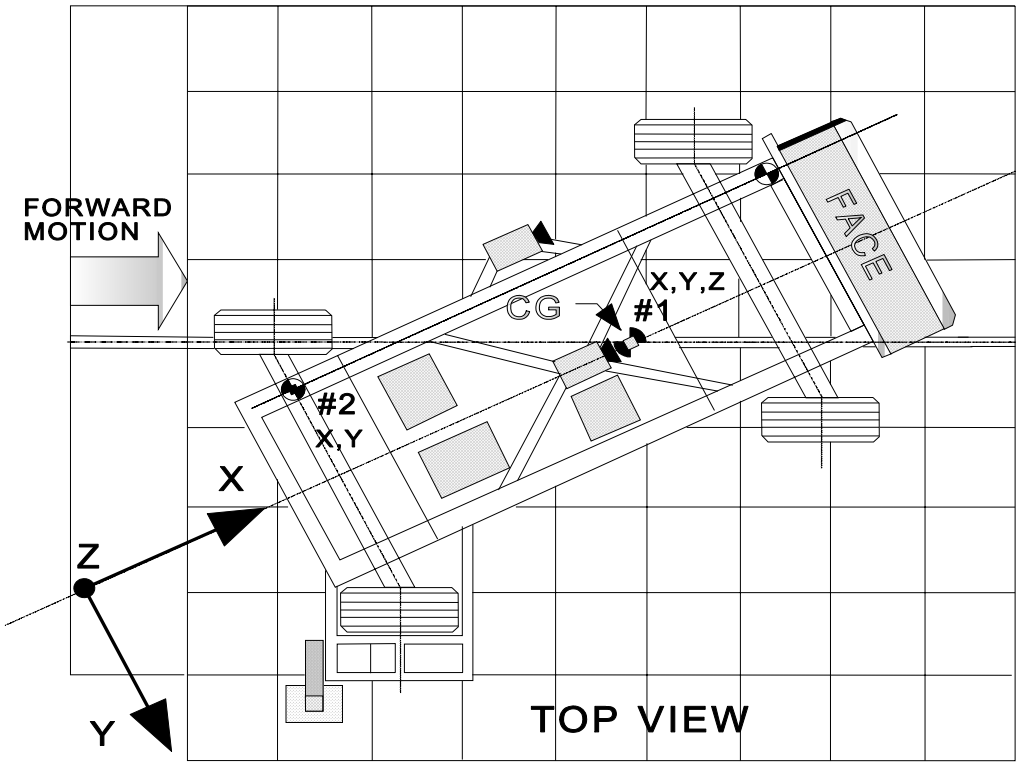


FIGURE 7

NOTE: Accelerometer #2 is placed on the left side of MDB for an impact into the left (driver) side of a test vehicle and is placed on the right side of the MDB when impacting the right (passenger) side of the test vehicle.

9. PHOTOGRAPHIC DOCUMENTATION

Each 61 kph side impact test shall be documented on 16 mm color movie film at a minimum speed of 1,000 frames-per-second (fps) except for the 24 fps real-time cameras. Glare or lights showing on any glass area (closed windows or vents) must be minimized so that views of the dummies during the test are visible for film analysis.

A timing mark must be registered on the film edge a minimum of every 10 milliseconds (ms) and a time zero impact mark must be registered on the film to indicate when contact is made in order to permit vehicle and dummy kinematic analysis on a film analyzer.

The vehicle interior may require auxiliary on-board lighting to ensure adequate film exposure.

The contractor shall report the locations of all cameras along with camera speeds and lens focal lengths on the appropriate final report data sheet. Camera locations shall be referenced to the target vehicle struck side and the leading edge of the MDB with the X, Y and Z coordinates of the lens recorded for each camera.

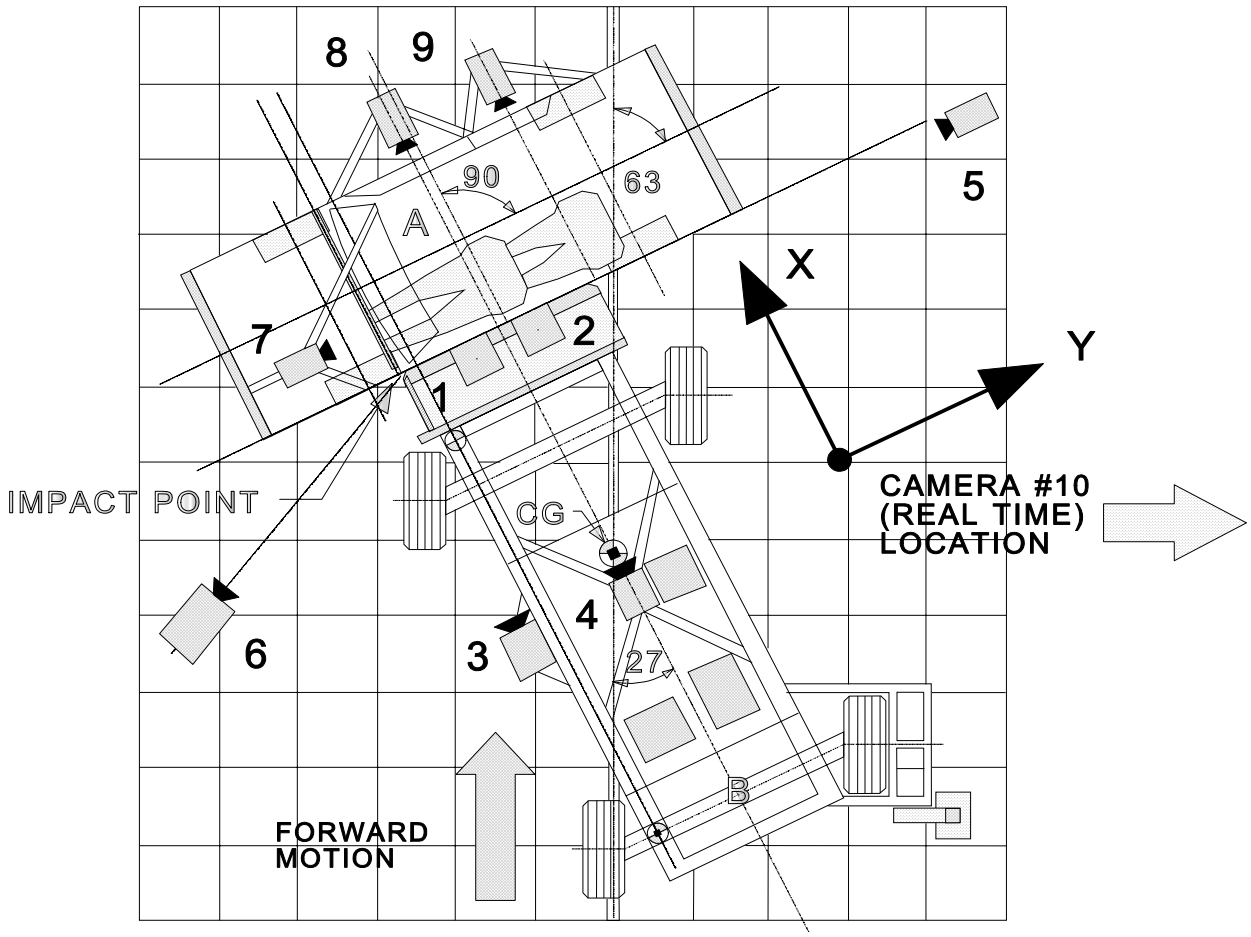


FIGURE 8

9. PHOTOGRAPHIC DOCUMENTATION....Continued

9.1 GROUND BASED CAMERAS REQUIRED (refer to **Figure 8**, preceding)

(1) Camera No. 1 -- high-speed overhead camera to view target vehicle dynamics and positioned directly above the impact plane between the target vehicle and the MDB.

(2) Camera No. 2 -- high-speed overhead camera to provide close-up view of the impact plane (should include view of photo targets on centerline of test vehicle and photo targets on top of MDB barrier face) and positioned adjacent to Camera No. 1.

(3) Camera No. 5 -- high-speed right side view camera to cover both the MDB and the target vehicle during the side impact event.

(4) Camera No. 6 -- high-speed left side view camera to cover the motion of the target vehicle after impact.

(5) Camera No. 10 -- real-time (24 fps) camera to provide pretest, test, and post test coverage.

(6) Camera No. 11 – High-speed (500 fps) camera for media coverage

9.2 MOVING DEFORMABLE BARRIER (MDB) ON-BOARD CAMERAS REQUIRED

(1) Camera No. 3 -- high-speed camera positioned along the impact face's left vertical edge to cover target vehicle impact point during side impact event.

(2) Camera No. 4 -- high-speed camera positioned on MDB's centerline to view struck side of test vehicle during the side impact event.

9.3 TEST VEHICLE ONBOARD CAMERAS REQUIRED

(1) Camera No. 7 -- high-speed camera to provide front view of the front SID through the vehicle's windshield from above the engine compartment.

(2) Camera No. 8 -- high-speed camera to view across the test vehicle's occupant compartment to record the lateral motion of the front dummy during and after side impact.

(3) Camera No. 9 -- high-speed camera to view across the test vehicle's occupant compartment to record the lateral motion of the rear dummy during and after side impact.

9. PHOTOGRAPHIC DOCUMENTATION....Continued

9.4 COLORING REQUIREMENTS FOR PHOTOGRAPHIC PURPOSES:

A. Vehicle interior surfaces such as the A, B, C-posts and trim panels, impacted interior door trim panels, etc., shall be painted with flat white paint. The area around the steering hub and instrument panel where air bag deploys, if so equipped, shall NOT be painted. In addition, the air bag indicator light on the dash shall NOT be painted so as to be visible prior to testing.

B. Parts of the driver and passenger dummies shall be coated with colored chalk/water solutions to show contact points with the vehicle's door and interior components. The chalk/water solution shall be applied after final dummy positioning.

CHALK COLORS TO BE USED ON TEST DUMMIES

DUMMY PART	DRIVER	PASSENGER
Face	Blue	Red
Top of Head	Yellow	Blue
Back of Head	Red	Yellow
Left Hip	Red	Yellow
Left Shoulder	Blue	Red

9.5 VEHICLE AND DUMMY PHOTOGRAPHIC COVERAGE (REAL-TIME)

The real-time camera (24 fps) shall be used to document the pretest and post test condition of the test vehicle and MDB in addition to the pretest and post test positions of both test dummies including the placement of the lap and shoulder belts on these dummies. Particular attention must be exercised to fully document the proper closing of all vehicle doors, including any rear hatchback or tailgate.

9.6 IMPACT EVENT MARKERS

It is strongly recommended that in-camera light emitting diodes (LEDS) be used to record the side impact event time zero point. If this is not possible, strobe lights or taped flash bulbs shall be placed in the field-of-view of all nine high-speed cameras to mark the time zero point. The contractor shall use pressure switches attached to the test vehicle or MDB's impact face in order to trigger the time zero indicators.

9. PHOTOGRAPHIC DOCUMENTATION....Continued

9.7 PHOTOGRAPHIC TARGETS AND TAPE FOR MDB AND TEST VEHICLE

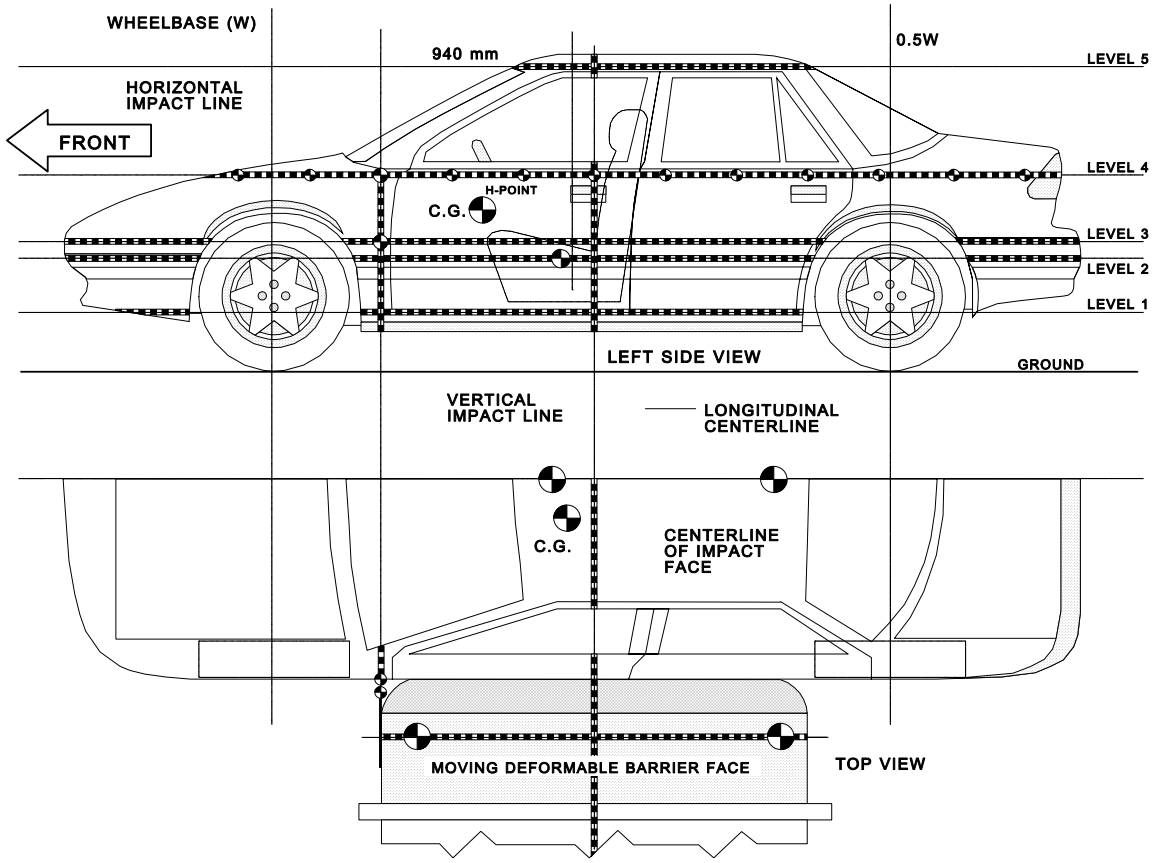


FIGURE 9

A. Twenty-five millimeter (1") wide yellow/black checkerboard tape shall be placed along the struck side of the test vehicle (as shown in **Figure 9**) and at the following five levels above the ground surface --

(1) LEVEL 1 -- axle centerline height (or side sill top height)

(2) LEVEL 2 -- occupant H-Point height

(3) LEVEL 3 -- mid-door height

(4) LEVEL 4 -- window sill height

(5) LEVEL 5 -- top of window height

In addition, the tape will be used to mark the longitudinal and vertical impact lines on the struck side of vehicle. This tape should be extended across the hood or cowl top of the vehicle (90° angle to the vehicle longitudinal centerline) to provide a reference line for the overhead film coverage (tape will be aligned with two MDB left side frame targets to verify 90° impact angle).

9. PHOTOGRAPHIC DOCUMENTATION....Continued

B. Photographic targets [102 mm diameter (4")] shall be placed on the struck side of the test vehicle every 300 mm along the LEVEL 4 tape line and at the front top left side and rear top left side of the MDB frame.

C. Other targets shall be placed on the test vehicle as shown in **Figure 9**.

D. Tape shall be placed on the barrier face as shown on in **Figure 10**.

E. CG marker and other known location markers shall be visible on the MDB in the overhead view.

F. Photographic targets [102 mm diameter (4")] shall be placed on the MDB at the rear cross member accelerometer location on the left side of the frame.

G. Tape on top left surface of honeycomb barrier and tape on top of test vehicle along impact line will be used to document initial impact location.

H. Two [102 mm (4")] diameter targets will be placed on top of barrier face 400 mm from barrier centerline.

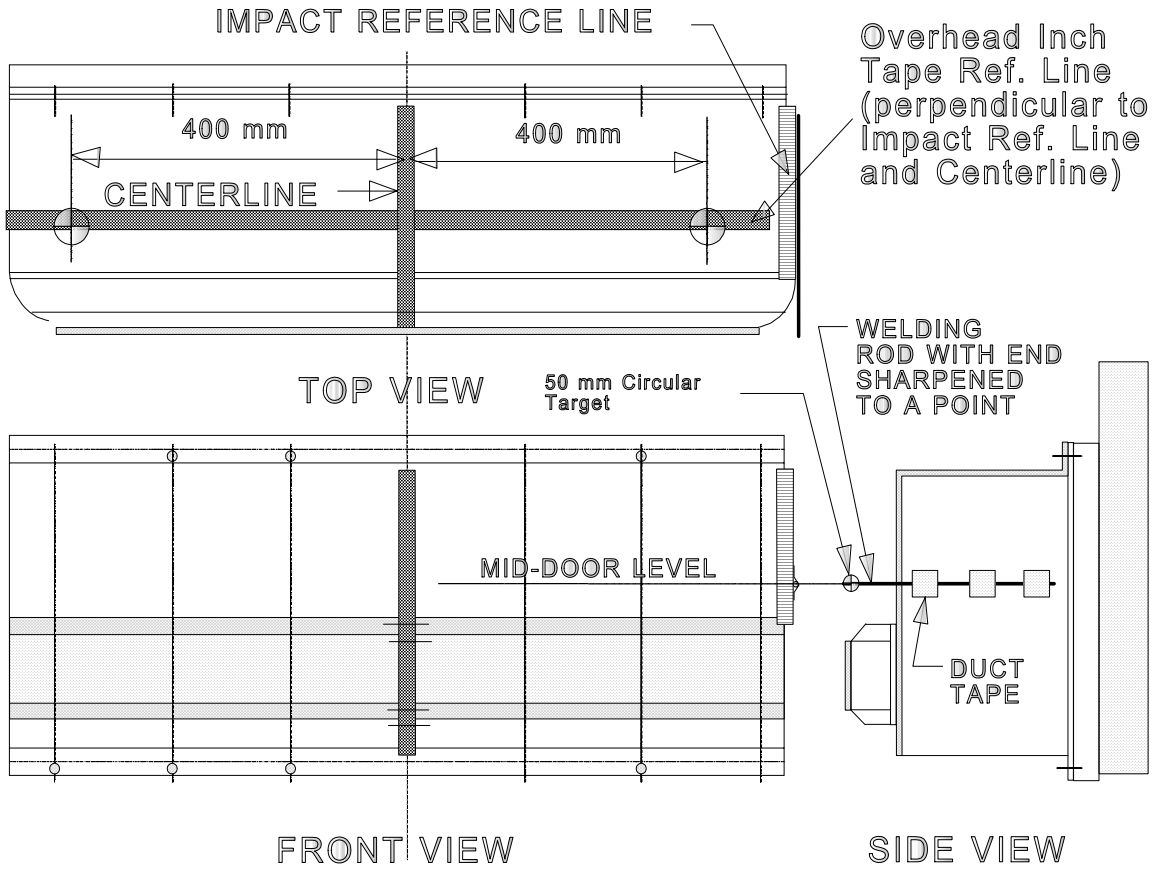


FIGURE 10

9. PHOTOGRAPHIC DOCUMENTATION....Continued

9.8 TARGET VEHICLE INFORMATION PLACARDS

Test vehicle identification placards shall be positioned so that at least one placard will be visible in each of the 10 camera's field of view. The following information shall be shown:

A. Target vehicle's NHTSA number

B. The words "55/28 kph 90° NCAP Side Impact"

C. Date of the side impact test

D. Name of contract laboratory

E. Vehicle year, make and model

9.9 CRASH FILM TITLE HEADING & SEQUENCE:

The contractor shall submit 3 copies of the 16mm color movie film for each crash test two weeks from the date of the vehicle crash test. The master print for each of the crash test films shall be retained by the contractor, but will be made available to the OCWS upon request.

The 16 mm color test movie film shall include the following title frames:

A. The following NCAP Side Impact Test was conducted under the contract with the National Highway Traffic Safety Administration by (laboratory name, city, state).

B. 55/28 kph 90° NCAP SIDE IMPACT (MOVING DEFORMABLE BARRIER)
Test Vehicle Model Year, Make and Model
NHTSA No. MXXXXX
Date of Impact Event
Contract No.: DTNH22-0X-X-XXXXX

C. The ending frame shall state "THE END".

The film shall be edited in the following sequence:

1. Title
2. Pretest Coverage
3. Real Time Pan Coverage
4. All high speed coverage
5. Post test Coverage
6. Any vehicle failures or anomalies
7. "The End"

9. PHOTOGRAPHIC DOCUMENTATION....Continued

9.10 STILL PHOTOGRAPHS

Photographs shall be color, 203 mm x 254 mm (8" x 10"), and legible. A tag, label or placard identifying the test vehicle model as well as the deformable barrier and NHTSA number, if applicable, shall appear in each photograph and be legible. The test vehicle and deformable barrier shall show the test date. Each photograph shall be labeled as to subject matter. As a minimum the following photographs shall be included:

A. Pretest and post test frontal views of the target vehicle

B. Pretest and post test rear views of the target vehicle

C. Pretest and post test side views of the struck side of the target vehicle showing initial contact point longitudinally and vertically on the target vehicle

D. Pretest close-up view of welding rod impact point

E*. Pretest and post test frontal views of the impactor face

F*. Pretest and post test left side views of the impactor face

G*. Pretest and post test right side views of the impactor face

H*. Pretest and post test top views of the impactor face

I. Pretest overhead view of the MDB positioned against the side of the target vehicle at the ideal impact point

J. Pretest and post test occupant compartment views showing the SID positions and the available clearance between the dummy and the struck door, as well as positions of belt restraints (photographs with door closed and with door open)

K. Pretest left side view of MDB with impact face in position

L. Pretest right side view of MDB with impact face in position

M. Post test close-up view of impact point target showing impact location

N. Pretest view of MDB showing (right and left side) contact switches in place

O. Pretest and post test views of front inner door panel

P. Pretest and post test views of rear inner door panel

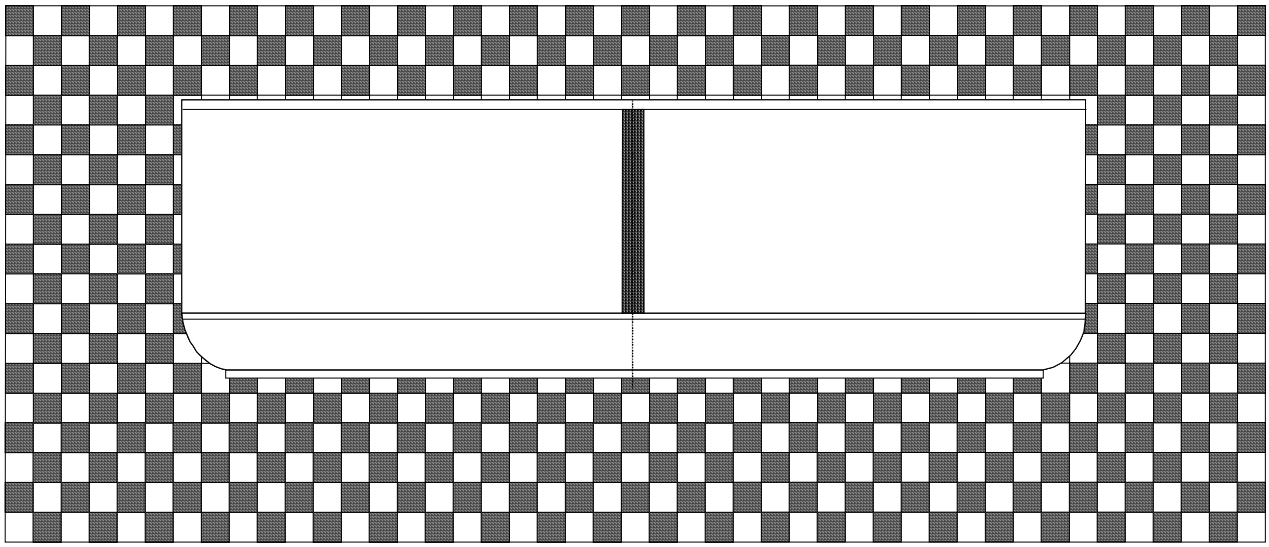
Q. Close-up view of vehicle's certification label

R. Close-up view of vehicle's tire information placard or label

S. Post test overhead view of the MDB and the target vehicle

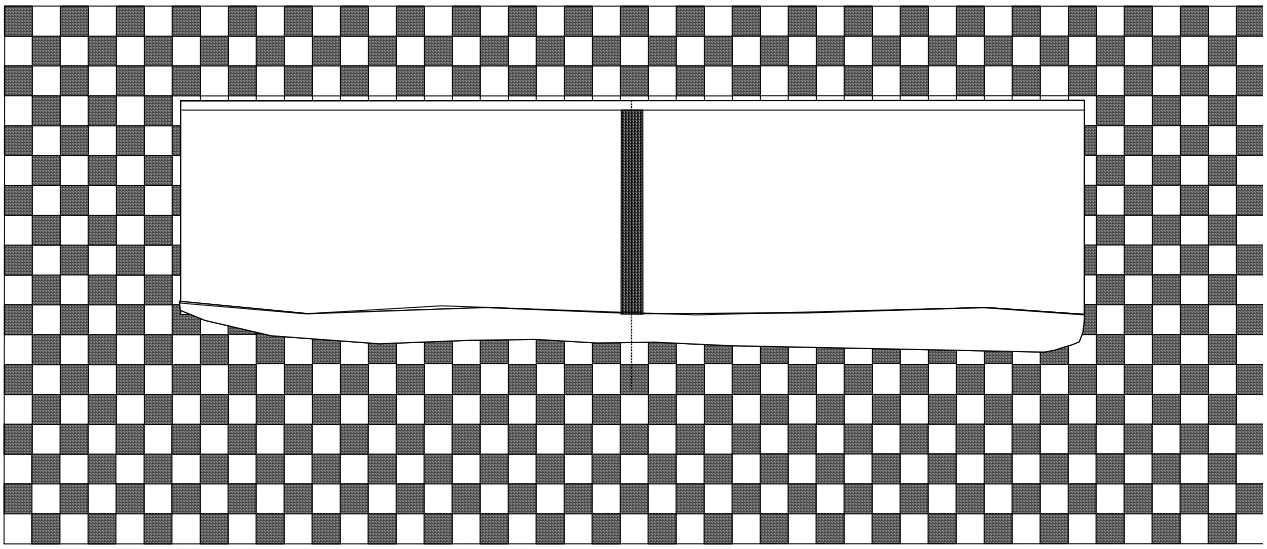
* - These photographs of the impactor face shall be taken with the impactor face placed on a checkerboard background (see **Figures 11 & 12**).

MEASUREMENT OF MDB DEFORMATION



PRETEST MOVING DEFORMABLE BARRIER FACE

TOP VIEW



POST TEST MOVING DEFORMABLE BARRIER FACE

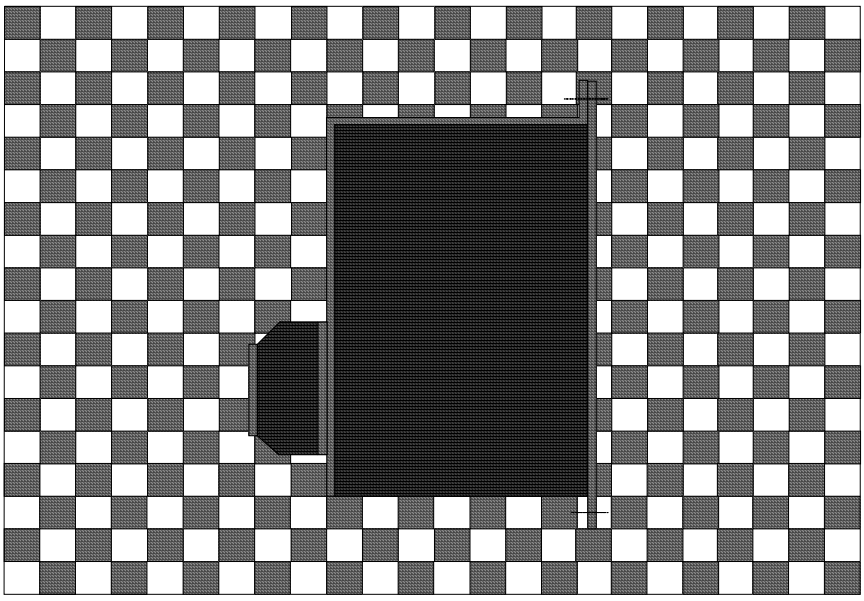
TOP VIEW

FIGURE 11

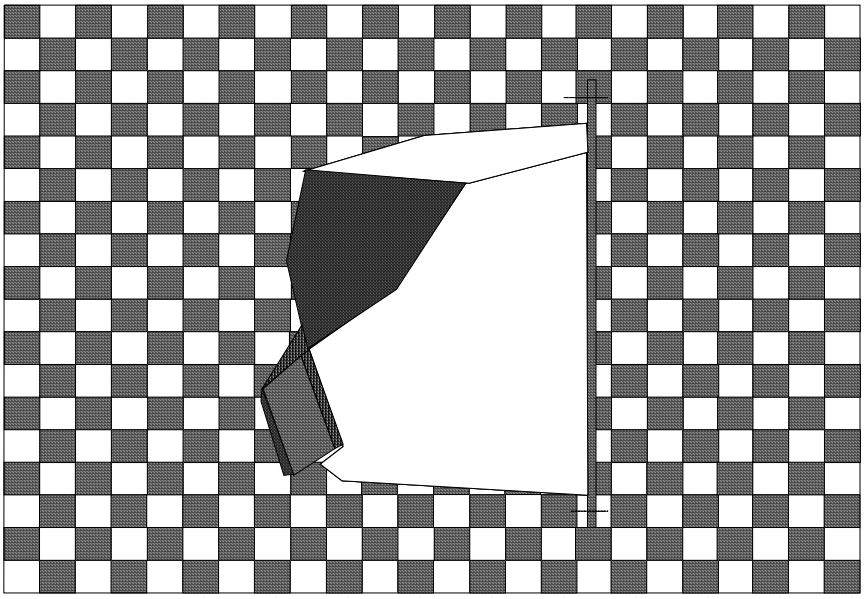
9. PHOTOGRAPHIC DOCUMENTATION....Continued

Contractors should take photographs of both the left and right side of MDB.

MEASUREMENT OF MDB DEFORMATION



PRETEST MOVING DEFORMABLE BARRIER FACE
LEFT SIDE VIEW



POST TEST MOVING DEFORMABLE BARRIER FACE
LEFT SIDE VIEW

FIGURE 12

10. DEFINITIONS

CURB WEIGHT

The weight of a vehicle with standard equipment; maximum capacity of engine fuel, oil, coolant; and, if so equipped, air conditioning and additional weight optional engine.

DESIGNATED SEATING CAPACITY (DSC)

The number of designated seating positions provided as found on the tire information placard (required by FMVSS 110). This number must be consistent with the number of restraints in the vehicle.

DESIGNATED SEATING POSITION (DSP)

Any plan view location capable of accommodating a person at least as large as a 5th percentile adult female, if the overall seat configuration and design and vehicle design is such that the position is likely to be used as a seating position while the vehicle is in motion, except for auxiliary seating accommodations such as temporary or folding jump seats. Any bench or split-bench seat in a passenger car, truck or multipurpose passenger vehicle with a GVWR less than 10,000 pounds, having greater than 1,270 mm of hip room (measured in accordance with SAE Standard J 1100(a) shall not have less than three designated seating positions, unless the seat design or vehicle design is such that the center position cannot be used for seating.

FULLY LOADED ATTITUDE

The vehicle attitude when the vehicle is loaded to its unloaded vehicle weight plus its rated luggage and cargo capacity (placed along the longitudinal centerline of the vehicle in the luggage compartment), plus the two fully instrumented (with shoes) test dummies placed in the test configuration.

Note: Even if the rear seat is exempt from performance criteria, the rear test dummy must be placed in vehicle when determining fully loaded attitude.

H-POINT

The mechanically hinged hip point of a manikin which simulates the actual pivot center of the human torso and thigh, described in SAE Recommended Practice J826, "Manikin for Use in Defining Vehicle Seating Accommodations," May 1987.

HORIZONTAL IMPACT LINE

This is the reference line used as the nominal vertical impact point. It is defined by the static pretest height of the welding rod attached to the MDB (typically this height is the same as the mid-door level). It is suggested that this height be at mid-door level, however this is not required so long as whatever height is used is clearly marked on the target vehicle (such as by using a 50mm (2 inch) diameter photo target) so that a post test measurement of relative vertical impact height can be determined. See Figure 16 on page 48.

LONGITUDINAL OR LONGITUDINALLY

Parallel to the vehicle's longitudinal centerline.

10. DEFINITIONS....Continued

TEST DUMMIES

The SID is identical in many respects to the existing P572 B test dummy used in FMVSS 208 with several exceptions. The thorax and pelvis have been redesigned to produce human-like acceleration responses in the lateral direction. Also, the dummy has provision to mount accelerometers for ribs, spine and pelvis; a shock absorber between the ribcage and the spine; and a hinge where the ribs attach to the spine. The SID does not have articulating arms or shoulders. Instead, the mass of the arms has been incorporated into the mass of the thorax, and urethane foam arms have been added for the appropriate biofidelity characteristics.

The SID/H3 is identical to the SID dummy except for the addition of the Hybrid three dummy head and neck. The torso of the SID has been outfitted with a special neck bracket which allows for the head and neck of the Hybrid 3 dummy to be attached. The head consist of 3 accelerometers, which are able to measure injury to the brain. The neck is able to measure bending, flexion, and shear forces during the impact.

UNLOADED VEHICLE WEIGHT (UVW)

The weight of a vehicle with maximum capacity of all fluids necessary for operation of the vehicle, but WITHOUT cargo or occupants.

VERTICAL IMPACT REFERENCE LINE

This is the vertical reference line which is defined as being 940 mm ± 5 mm forward of the vehicle's wheelbase centerline for vehicles with wheelbases of 2,896 mm or less. For vehicles with wheelbases greater than 2,896 mm the vertical reference line is located 508 mm ± 5 mm rearward of the vehicles front axle.

For multipurpose vehicles (sport utility vehicles), light trucks, and vans, when the test vehicle's wheelbase is ≤ 2,489 mm, the vertical impact line is 305 mm ± 5 mm rearward of the centerline of the test vehicles front axle. If the wheelbase is greater than 2,489 mm but less than 2,896 mm, then the vertical impact reference line is 940 mm ± 5 mm forward of the test vehicle's wheelbase centerline. If greater than 2,896 mm then the vertical impact line is 508 mm ± 5mm rearward of the test vehicle's wheelbase centerline.

NOTE: For different wheelbase versions of the same model vehicle the impact reference point may be found (at the manufacturers option) by the following: Select the shortest wheelbase vehicle of the different versions of the same model and locate on it the impact reference line as described above. Measure the distance between the seating reference point and the impact reference line. Maintain the same distance between the seating reference point and the impact reference line for the shortest wheelbase version of the model.

11. TEST EXECUTION

11.1 TEST VEHICLE PREPARATION

A. VEHICLE TEST WEIGHT

AS DELIVERED

After the test vehicle is received, fluids will be added to specified levels or filled to capacity and the vehicle weight recorded to determine the "Unloaded Vehicle Weight" (UVW).

NOTE: The scales used to weigh the test vehicle shall be accurate to within 0.1%.

RATED CARGO AND LUGGAGE WEIGHT

FMVSS 110 requires that the Vehicle Capacity Weight (VCW) and the Designated Seating Capacity (DSC) be recorded on the tire information placard. This information can be used to determine the "Rated Cargo and Luggage Weight" (RCLW) as follows:

RCLW = VCW - (68 kg x DSC)

NOTE: If RCLW is greater than 300 pounds, use 300 pounds.

FULLY LOADED (CALCULATED TEST VEHICLE TARGET WEIGHT)

The fully loaded condition is the vehicle loaded to its UVW, plus the vehicles RCLW (located along the vehicles longitudinal centerline in the luggage compartment), plus the weight of the necessary (1 or 2 dependent on whether vehicle is a 2 or 4 seater) fully instrumented SID(s), placed in the test configuration.

The calculated Test Vehicle Target Weight (TVTW) [fully loaded test weight] is computed as follows:

TVTW = UVW + RCLW + [(instrumented Dummy)* x (Dummy weight)]
**(1 or 2 SIDs dependent on 2 or 4 seater vehicle)*

NOTE: *EXEMPT SEATING POSITIONS* - If a dummy cannot be seated in the vehicle according to the requirements of S7 of FMVSS No. 214D, that seating position is considered exempt from the performance requirements of the standard. However, this does not mean that the Dummy is not used during testing. The fully instrumented Dummy must be placed in the vehicle when determining the "fully loaded" and "as tested" vehicle weight. The placement of the exempt Dummy shall not interfere with the placement of the front seat (nonexempt) Dummy. The COTR shall make the final determination on how the Dummy will be placed in the exempt seating position of the vehicle.

11. TEST EXECUTION....Continued

AS TESTED VEHICLE WEIGHT

Drain the fuel system and operate the engine until the fuel system is dry. Slowly refill the entire fuel system (rotate engine) with Stoddard solvent which has been dyed purple, having the physical and chemical properties of Type 1 solvent or cleaning fluid, Table 1, ASTM Standard D484-71, "Standard Specifications for Hydrocarbon Dry-cleaning Solvents" until, not less than 92 percent and not more than 94 percent, of the vehicle manufacturer's stated "usable capacity" is reached (use the useable capacity supplied by manufacturer, do not use values in the owners manual). This volume will be furnished by the COTR. The Stoddard solvent must be filtered while being introduced into the fuel system. Drain all other fluids from the test vehicle with the exception of brake fluid if required for abort system, so that Stoddard solvent leakage from the fuel system will be evident. Just prior to the test, operate the engine to assure that Stoddard solvent is present throughout the entire fuel system.

NOTE: It is permissible to cut small holes in coolant hoses and transmission torque converters to assure that all fluid other than Stoddard solvent has been removed from the vehicle.

Load the vehicle with the required instrumented test dummies and necessary on-board test equipment (including all instrumentation boxes, cameras, lighting, etc.) and then add ballast, if necessary, to achieve the Test Vehicle Target Weight. Weigh the vehicle again and record this weight as the **actual** Test Vehicle Weight (TVW).

The **Actual** Test Vehicle Weight (TVW) shall have the following boundaries:

$$\textit{(Calculated TVTW - 4.5 kg.)} \geq \textit{Actual TVW} \geq \textit{(Calculated TVTW - 9 kg.)}$$

If the Calculated Test Vehicle Target Weight (TVTW) is exceeded, the contractor must notify the COTR to discuss the possible removal of vehicle components or instrumentation which would decrease the weight.

NOTE: Under no circumstances shall the actual vehicle test weight be greater than the Test Vehicle Target Weight (TVTW).

NOTE: FMVSS 208-type instrumentation may not be adequate unless it can be placed outside the vehicle to record data via an umbilical cable or equivalent.

11. TEST EXECUTION....Continued

B. VEHICLE ATTITUDE

If vehicle has auto-leveling system the ignition must be set to the "on" position when attitude measurements are made. For vehicle with other leveling system exercise the vehicle per manufacturer's instruction before taking measurements.

AS DELIVERED

Determine the distance between a level surface, for example a flat roadway, and a standard reference point on the test vehicle's body, directly above each wheel opening, when the vehicle is in its "as delivered" (UVW condition) with all tires inflated to the manufacturer's specifications as listed on the vehicle's tire information label or placard. The vehicle suspension should be exercised prior to making measurements. This entails pushing up and down on all four corners of the vehicle at least 5 times in an interval not to exceed 40 seconds.

FULLY LOADED

Determine the distance (after the vehicle's suspension has been "exercised" and left to settle for at least 10 minutes) between the same level surface or reference plane and the same standard reference points in the vehicle's "fully loaded condition." The "fully loaded condition" is the test vehicle at the target test weight which is (UVW + RCLW + required number of SIDs). The SID(s) are placed in the test configuration and are fully instrumented with shoes and clothing. The load placed in the cargo area shall be centered over the longitudinal centerline of the vehicle.

AS TESTED (PRETEST)

Determine the distance (after the vehicle has been "exercised" and left to settle for at least 10 minutes) between the same level surface or reference plane and the same standard reference points in the vehicle's "as tested condition." The "as tested condition" is the test vehicle at the target test weight which is (UVW + required number of SIDs + instrumentation & necessary test equipment + ballast (if necessary)). The pretest vehicle attitude shall be equal to either the as delivered or fully loaded attitude or between the as delivered attitude and the fully loaded attitude. If correct attitude cannot be attained, COTR shall be notified to determine whether to proceed with test.

NOTE: If vehicle is raised off the ground to make weight measurements, the vehicle should be rolled for at least 10 meters and left to settle for 10 minutes before the "as delivered" or "fully loaded" attitude measurements are made.

C. EXTERIOR PROFILE MEASUREMENTS

Prior to the test (with the test vehicle in the "as tested" configuration) exterior profile measurements of the impact side of the vehicle shall be made. These (pre and posttest) measurements are to be made at all five levels across the entire length of the vehicle at 150 mm intervals. These lateral measurements (recorded on Data Sheet 10, see section 14) are made from a reference plane which is parallel to and 1000 mm from the test vehicle's longitudinal centerline.

Note: The post test measurements shall begin at the first 150 mm mark forward of forward-most point of the induced damage and end at the first (150 mm) mark past the rearward-most point of the induced damage (see Data Sheet 10.)

11. TEST EXECUTION....Continued

D. All test vehicle doors, including any rear hatchback or tailgate, shall be fully closed and latched but NOT LOCKED. Before performing the act of door closing, knowledge of the door configuration and operation must be acquired (from test vehicle preparation data submitted by vehicle manufacturer). Particular care must be exercised to close doors with 2-stage (primary and secondary) latch systems. Confirm that all doors are properly closed by checking indicators in vehicle instrument panel if so equipped. Also, see photographic section for full documentation of door closing with real time camera

E. The test vehicle tire pressures shall meet those provided by the vehicle manufacturer on the tire placard or label.

F. The test vehicle's struck side windows shall remain CLOSED but the opposite side windows shall be open to facilitate photography.

G. Manual transmissions shall be placed in SECOND gear.

H. Automatic transmissions shall be placed in NEUTRAL.

I. Parking brakes shall be ENGAGED.

J. Adjustable seats (on impact and non-impact side) are placed in the adjustment position midway between the forward most and rearmost positions, and then if separately adjustable in a vertical direction, are adjusted to the lowest position. If an adjustment position does not exist midway between the forward-most and rearmost positions, the closest adjustment position to the rear of the midpoint is used. (i.e., the seat will be moved more rearward.)

K. Place all adjustable seat backs in the manufacturer's nominal design riding position in the manner specified by the manufacturer. If the position is not specified, set the seat back at the first detent rearward of 25 degrees from the vertical.

L. Place each adjustable head restraint in its highest adjustment position. Position adjustable lumbar supports so that they are set in their released, i.e., full back position.

M. Adjustable steering controls are adjusted so that the steering wheel hub is at the geometric center of the locus it describes when it is moved through its full range of driving positions. If there is no detent at this position the steering controls will be adjusted according to the manufacturer's instructions.

N. Convertibles and open-body type vehicles have the top, if any, in place in the closed passenger compartment configuration.

O. The test dummies shall be restrained using ALL available belt systems in all seating positions.

P. Onboard cameras may be removed (with approval of COTR) if there is a problem attaining the test weight of the vehicle. Instrumentation should be removed first if possible.

Q. If there is a problem attaining the vehicles test weight, the COTR may require the onboard instrumentation to be removed. This will entail the instrumentation to be flexible enough to record data outside of the vehicle via umbilical cables or other equivalent (as approved by the COTR) devices.

11. TEST EXECUTION....Continued

11.2 DUMMY PREPARATION, POSITIONING AND PLACEMENT

The stabilized temperature of the test dummy at the time of the side impact test shall be at any temperature between **18.9° C** and **25.5° C**. Each test dummy shall be clothed in form fitting cotton stretch garments with short sleeves and mid-calf length pants. Each foot of the dummy shall be equipped with a size 11EEE shoe which meets the configuration, size, sole, and heel thickness specifications of MIL-S-13192 and weighs 0.48 kg to 0.66kg.

Place test dummies in the test vehicle the morning of test day.
Do not place the dummies in the vehicle the day before testing for overnight storage.

Dummy positioning procedures are detailed in **APPENDIX IV**.

The final positions of the driver and passenger dummies seated in the test vehicle shall be recorded (see **figures 13 & 14**) by taking the following measurements (accurate to within ± 3 mm):

Dummy Longitudinal Clearance Dimensions

*HH *Head to Header* - taken from the point where the dummy's nose meets his forehead (between his eyes) to the furthest point forward on the header.

*HW *Head to Windshield* - taken from the point where the dummy's nose meets his forehead (between his eyes) to a point on the windshield. Use a level.

HZ *Head to Roof* - taken from the point where the dummy's nose meets his forehead (between his eyes) to the point on the roof directly above it. Use a level.

*CS *Steering Wheel to Chest* - taken from the center of the steering wheel hub to the dummy's chest. Use a level.

*CD *Chest to Dash* - place a tape measure on the tip of the driver dummy's chin and rotate 125mm of it downward toward the dummy to the point of contact on the transverse center of the dummy's chest. Then measure from this point to the closest point on the dashboard either between the upper part of the steering wheel between the hub and the rim, or measure to the dashboard placing the tape measure above the rim, whichever is a shorter measurement.

CB *Chest to Back of Seat* - place a tape measure on the tip of the passenger dummy's chin and rotate 125 mm of it downward toward the dummy to the point of contact on the transverse center of the passenger dummy's chest. Then measure from this point to the closest point on the seat back directly forward of the rear outboard passenger seating position. Mark point on seat back for later *NB* measurement.

NR *Nose to Rim* - taken from the tip of the driver dummy's nose to the closest point on the top of the steering wheel rim

NB *Nose to Back of Seat* - taken from the tip of the passenger dummy's nose to the **same** point on the seat back located in *CB* measurement

KDL /KDR *Left and Right Knees to Dashboard* - taken from the center of the knee pivot bolt's outer surface to the closest point forward acquired by swinging the tape measure in continually larger arcs until it contacts the dashboard. Also reference the angle of this measurement with respect to the horizontal for the outboard knee (KDA).

11. TEST EXECUTION....Continued

KBL /KBR — *Left and Right Knees to Seat Back* - taken from the center of the knee pivot bolt's outer surface to the closest point forward acquired by swinging the tape measure in continually larger arcs until it contacts the seat back. Also reference the angle of this measurement with respect to the horizontal for the outboard knee (KBA).

PHX — *H-Point to Striker(X)* - locate a point on the striker; project this point (preferably, with a level) vertically downward; place tape measure on H-point and extend horizontally until it intersects level; record this measurement.

PHZ — *H-Point to Striker(Z)* - locate a point on the striker; project this point (preferably, with a level) horizontally toward the H-point; place tape measure on H-point and extend vertically until it intersects level; record this measurement.

NOTE: When testing 2-door vehicles, the *B-post* striker will be used as the reference point for PHX & PHZ measurements. When testing 4-door vehicles, the *B-post* striker will serve as the reference point for the front seat occupant, while the *C-post* striker will be used for the rear seat occupant.

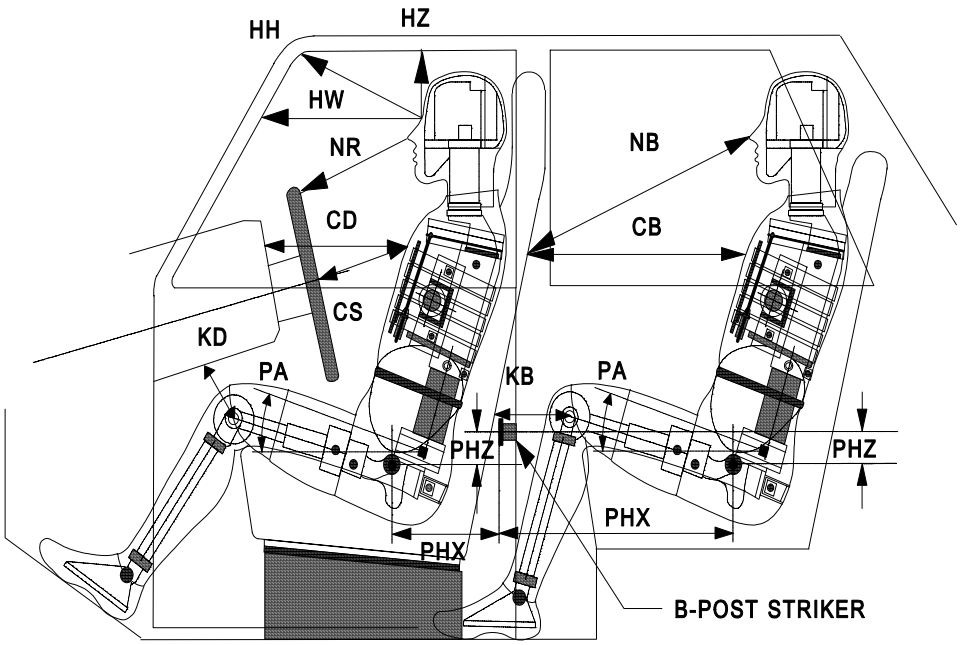


FIGURE 13

11. TEST EXECUTION....Continued

Dummy Lateral Clearance Dimensions

*HR *Head to Side Header* - measure the shortest distance from the point where the dummy's nose meets his forehead (between his eyes) to the side edge of the header just above the window frame, directly adjacent to the dummy.

*HS *Head to Side Window* - taken from the point where the dummy's nose meets his forehead (between his eyes) to the outside of the side window. In order to make this measurement, roll the window down to the exact height which allows a level measurement. Use a level.

*AD *Arm to Door* - taken from the center of the bottom of the arm segment where it meets the dummy's torso to the closest point on the door

*HD *H-point to Door* - taken from the H-point on the dummy to the closest point on the door. Use a level.

Angles

SA *Seat Back Angle* - measured using the instructions provided by the manufacturer on **Form No. 2 - Manufacturer Supplied Information**; If no information is supplied, place adjustable seat backs at the first detent rearward of 25 degrees from the vertical.

PA *Pelvic Angle* - taken by inserting the pelvic angle gauge into the H-point gauging hole on the SID and taking this angle with respect to the horizontal;

When a level is to be used, it is to ensure that the line containing the two points described is either parallel or perpendicular to the ground. If a measurement to be made is less than 250 mm ignore the directions to use a level and approximate a level measurement. Also, when a measurement is to be taken to or from the center of a bolt on the dummy, take the measurement from the center of the bolt hole if the bolt is recessed.

* Measurement used in Data Tape Reference Guide

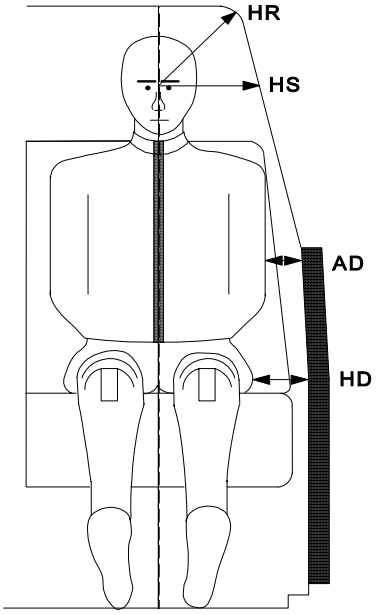


FIGURE 14

11. TEST EXECUTION....Continued

11.3 SIDE IMPACT TEST CONDITION

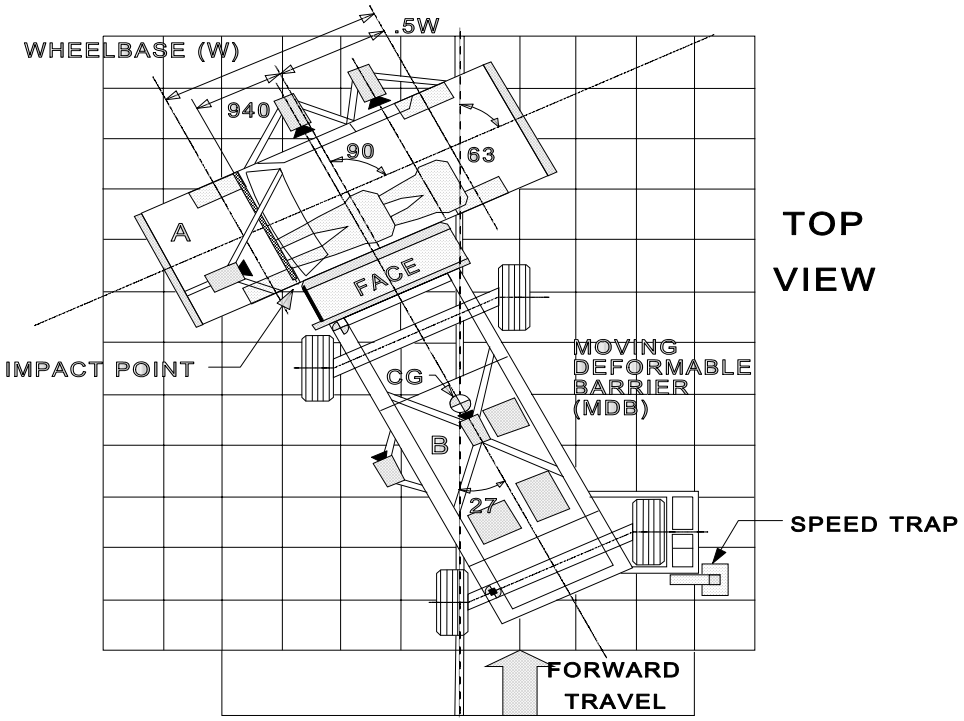


FIGURE 15

A. Test vehicle is VEHICLE A as shown in **Figure 15** above

B. Moving Deformable Barrier (MDB) is VEHICLE B

C. Line of forward motion of the MDB shall form an angle of 63° ± 0.5° with the centerline of the test vehicle.

D. Centerline of the MDB shall be perpendicular 90° ± 1.5° to the centerline of the test vehicle at the time of impact.

E. The MDB shall be crabbed at an angle of 27° ± 1° to the line of forward motion. This crabbed impactor position simulates a moving vehicle-to-vehicle collision.

F. Impact speed shall be 61.9 ± 0.8 kph for NCAP test purposes.

G. The MDB shall weigh 1,361 ± 4.5 kg for NCAP test purposes.

H. The longitudinal impact tolerance is ± 50 mm (between MDB and test vehicle).

I. The vertical impact tolerance is ± 20 mm.

J. The MDB brakes shall be applied 1,000 to 1,500 milliseconds (1- 1.5 seconds) after the side impact (duration of MDB/vehicle contact is approximately 150 milliseconds).

11. TEST EXECUTION....Continued

11.4 HONEYCOMB FACE WELDING ROD ALIGNMENT

The lateral guidance system assures that the MDB will impact the side of the target or test vehicle at the designated angle even though the MDB is crabbed to an angle of (27° ± 1°) degrees with the forward line of motion. The horizontal impact line offset tolerance (at the time of first contact between the target vehicle and MDB) shall be ± 50 mm at the left side vertical edge of the deformable impact surface. The vertical impact tolerance shall be ± 20 mm.

A welding rod sharpened to a point on one end will be attached along the left side vertical surface of the honeycomb barrier in the horizontal plane level with the mid-door of the test vehicle as shown in **figure 16**. The sharpened tip of the welding rod shall be positioned so as to contact the test vehicle body sheet metal during pretest setup when the MDB is positioned against the side of the test vehicle (a 50 mm diameter photo target shall be positioned on the vehicle so that the tip of the welding rod is located in the center of the target). The welding rod shall be attached to the left side vertical surface of the honeycomb barrier with duct tape. During the impact event, the point of the welding rod will provide a permanent indication on the test vehicle impact line. For redundancy, the initial contact between the tip of the welding rod and test vehicle shall be recorded by Camera No. 3.

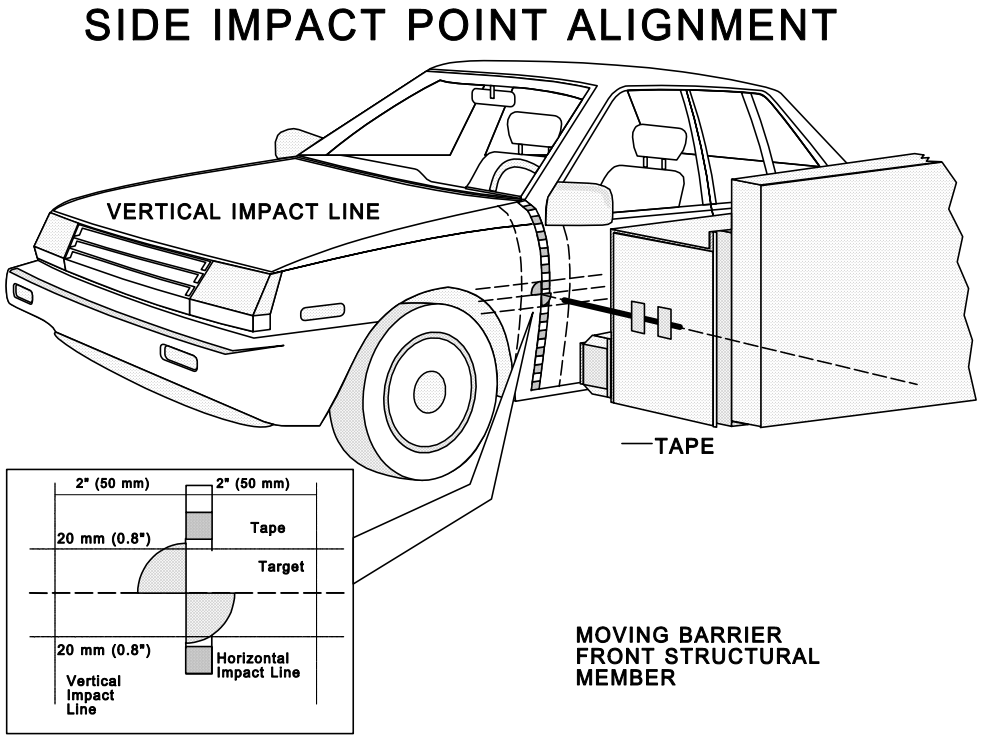


FIGURE 16

11. TEST EXECUTION....Continued

The vertical reference line (see **figure 17**, below) is defined as being 940 mm ± 5 mm forward of the vehicle's wheelbase centerline for vehicles with wheelbases of 2,896 mm or less. For vehicles with wheelbases greater than 2,896 mm the vertical reference line is located 508 mm ± 5 mm rearward of the vehicles front axle.

For multipurpose vehicles (sport utility vehicles), light trucks, and vans, when the test vehicle's wheelbase is ≤ 2,489 mm, the vertical impact line is 305 mm ± 5 mm rearward of the centerline of the test vehicles front axle. If the wheelbase is greater than 2,489 mm but less than 2,896 mm, then the vertical impact reference line is 940 mm ± 5 mm forward of the test vehicle's wheelbase centerline. If greater than 2,896 mm then the vertical impact line is 508 mm ± 5mm rearward of the test vehicle's wheelbase centerline.

NOTE: For different wheelbase versions of the same model vehicle the impact reference point may be found (at the manufacturers option) by the following: Select the shortest wheelbase vehicle of the different versions of the same model and locate on it the impact reference line as described above. Measure the distance between the seating reference point and the impact reference line. Maintain the same distance between the seating reference point and the impact reference line for the shortest wheelbase version of the model.

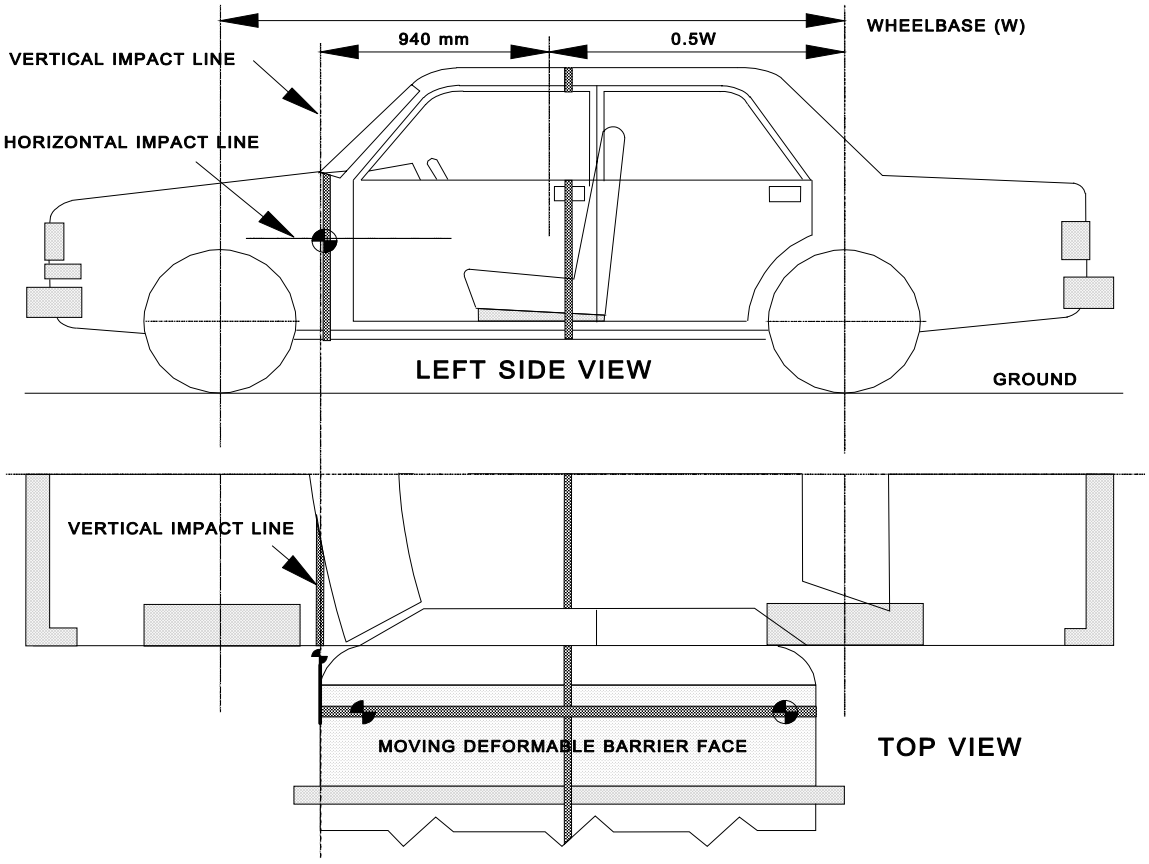


FIGURE 17

11. TEST EXECUTION....Continued

11.5 MOVING DEFORMABLE BARRIER (MDB) IMPACT FACE CRUSH MEASUREMENTS

The maximum static crush of the MDB's honeycomb face shall be measured in the longitudinal direction at the following vertical locations (see **Figure 18** below):

A. Center of Bumper Level = 432 mm above ground level

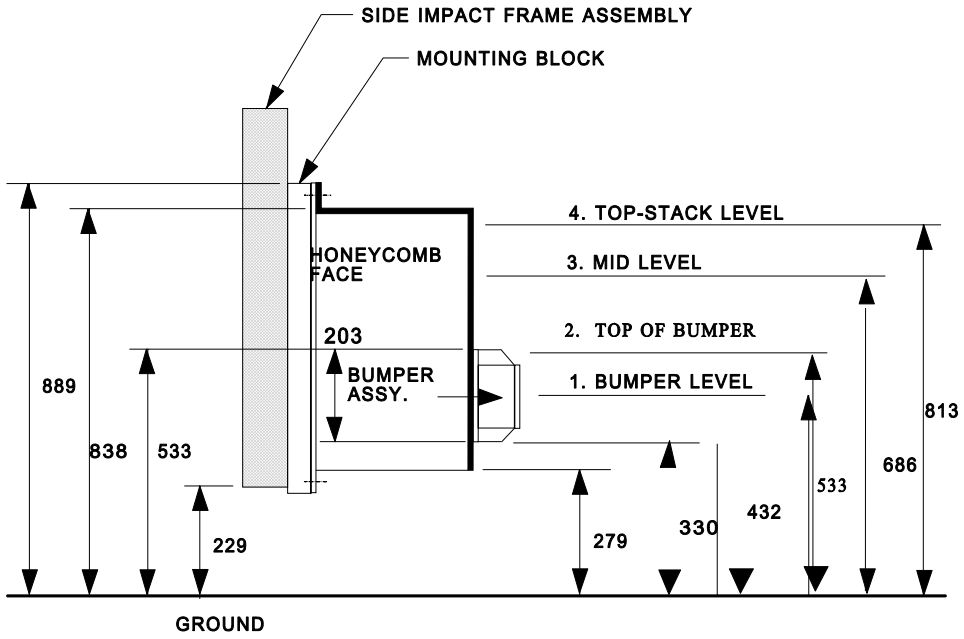
B. Top of Bumper Level = 533 mm above ground level

C. Mid Level = 686 mm above ground level

D. Top-stack Level = 813 mm above ground level

The crush data shall be recorded on Data Sheet No. 12, "Exterior Static Crush for Impactor Face" (see section 14). Pre and Post test measurements are taken (from a reference plane perpendicular to and 1,000 mm from the MDB's longitudinal centerline) across the barrier face at 100 mm intervals at each of the four levels specified above.

NOTE: The MDB crush measurement procedure is similar to the procedure used for vehicle crush measurements.



RIGHT SIDE VIEW

NOTE: All measurements are in millimeters and have a tolerance of ± 3 mm.

FIGURE 18

12. TEST DATA DISPOSITION

The contractor shall make all preliminary test data available to the COTR on location within two hours after the test. Final test data, including digital printouts and computer generated plots (if applicable), shall be furnished to the COTR within five working days. Additionally, the contractor shall analyze the preliminary test results as directed by the COTR.

12.1 PERFORMANCE REQUIREMENTS

Since the NCAP side impact tests serve as indicant tests to the requirements of the FMVSS No. 214D, the definition and methods of calculation of these requirements are described herein:

These performance requirements are determined by measuring the accelerations to which struck side occupants (front and rear) are subjected during the side impact event.

The test is designed to simulate a 90-degree side impact where the bullet vehicle (MDB) speed is twice that of the target vehicle. Since the target vehicle is stationary in our test, the bullet vehicles velocity and orientation are adjusted to simulate an impact where both vehicles were moving.

The test dummy (SID or SID/H3) shall be used for testing and will be located in the front and rear (if available) seat positions on the struck side of the target vehicle. The dummies will be instrumented to measure chest and pelvis accelerations or in the case of SID/H3, head and neck data, which will then be used to assess vehicle performance.

A. CHEST INJURY CRITERION -- the chest injury criterion is composed of maximum rib and lower spine peak accelerations. They are combined as follows:

$$TTI(d) = [\ A\ (\text{max. rib}) + A\ (\text{lwr. spine})\ ] / 2$$

where

TTI(d) = Thoracic Trauma Index

- o - 85g's for cars having 4 side doors
- o - 90g's for cars having 2 side doors

A (max. rib) = max value of EITHER the upper OR lower rib peak acceleration (rounded to 3 significant digits to the right of the decimal point ie, 43.225).

A (lwr. spine) = lower spine peak acceleration (rounded to 3 significant digits to the right of the decimal point).

TTI(d) = Thoracic Trauma Index (dummy) (rounded to the nearest whole number, anything greater than or equal to 0.50 is rounded up to the nearest whole number, anything less than 0.50 is rounded down to nearest whole number).

12. TEST DATA DISPOSTION....Continued

A1. HEAD INJURY CRITERION — HIC (for SID and SID/H3 only) -- the head injury criterion is computed from the resultant acceleration (A_R) in g units at the dummy head c.g. It is known as the HIC.

$$HIC = \left[\frac{1}{t_2 - t_1}\int_{t_1}^{t_2} A_R dt\right]^{2.5}(t_2 - t_1)$$

Where $A_R=[A_x^2 + A_y^2 + A_z^2]^2$. t_2 and t_1 are any two points in time during the impact event which are separated by not more than a 36 millisecond time which would maximize the HIC integration.

B. PELVIS INJURY CRITERION -- the pelvis injury criterion is the measured peak lateral acceleration on the pelvis. This is displayed as a whole number (use same round-off procedure used for determining TTI). This shall not exceed 130g's.

C. TEST VEHICLE ASSESSMENT -- performance requirements are as follows:

Vehicle Structural Integrity -- At the completion of each test the passenger car shall be examined to determine:

A. Whether the door(s) on the struck side of the test vehicle separated from the vehicle's main body at the hinges or latches.

B. Whether the door(s) on the far side (side opposite from the struck side) opened during the side impact crash event.

C. On hatchback models, whether the hatch opened during the side impact crash event.

D. The intrusion levels into the occupant compartment.

NOTE: All examination results shall be recorded in the final test report.

12. TEST DATA DISPOSITION....Continued

12.2 DATA PROCESSING

The acceleration data from the accelerometers mounted on the ribs, spine and pelvis of the test dummy are processed with the FIR 100 software.

Instrumentation and sensors used must conform to the SAE J-211 (1990) recommended practice requirements. The outputs of the accelerometers installed in the dummy are then processed with the software for the Finite Impulse Response (FIR) filter (FIR 100 software). The FORTRAN program for this FIR 100 software (FIR 100 Filter Program, Version 1.0, July 16, 1990) is incorporated by reference in 572.40 of the FMVSS No. 214D. The data are processed in the following manner:

A. Analog data recorded in accordance with SAE J-211 (1990) recommended practice channel class 1000 specification

B. This data is then filtered with the FIR 100 Filter Program (Version 1.0, July 16, 1990).

12.3 FIR 100 FILTER (VERSION 1.0, JULY 16, 1990)

The FIR 100 Filter does the following:

A. Filters the data with a 300 Hz, SAE Class 180 filter

B Subsamples the data to a 1600 Hz sampling rate

C. Removes the bias from the subsampled data

The FIR 100 Filter Program has the following characteristics:

A. Passband frequency -- 100 Hz

B. Stopband frequency -- 189 Hz

C. Stopband gain -- 50 db

D. Passband ripple -- 0.0225 db

12.4 COMPUTER DATA TAPE

The contractor shall deliver to OCWS the final data tape or diskettes, digital printouts, and plots within five (5) working days after the crash test.

12. TEST DATA DISPOSITION....Continued

12.5 TEST DATA LOSS AND RETEST

An NCAP side impact test is not to be conducted unless all of the various test conditions specified in the applicable OCWS Laboratory Test Procedure have been met. Failure of a contractor to obtain the required critical test data (such as TTI, Pelvic-G, etc.) and to maintain acceptable tolerance limits on test parameters (such as impact velocity and impact point or location) in the manner outlined in the applicable OCWS Laboratory Test Procedure may require a retest at the expense of the contractor. The retest costs will include the cost of the replacement vehicle (with the same equipment as the original vehicle) or item of motor vehicle equipment and all costs associated with conducting the retest. The original test vehicle used for the invalid test shall remain the property of OCWS, and the retest vehicle shall remain the property of the contractor. If there is a test failure, the contractor shall retain the retest vehicle including the deformable barrier face for a period not exceeding 180 days. If there is no test failure, the Contractor may dispose of the test vehicle including the deformable barrier face upon notification from the COTR that the final test report has been accepted, after the stipulated minimum period specified as follows.

The tested vehicles and tested honeycomb barrier faces, protected from the elements, shall be retained by the test contractor for a MINIMUM of 60 days so that OCWS and vehicle manufacturer personnel can be given an inspection opportunity.

The Contracting Officer of NHTSA is the only official authorized to notify the contractor that a retest is required. The retest shall be completed within two (2) weeks after receipt of notification by the Contracting Officer that a retest is required. If a retest is conducted, no test report is required for the original test.

12.6 PARTIAL PAYMENT

The contractor shall exercise reasonable control to insure that no data is lost or rendered useless. If some non-critical data (such as camera failure, film breakage) and/or critical data (such as dummy acceleration and barrier speed control data) are not obtained for the crash test and the test is accepted by the Agency, **partial payment may** be made by deducting the costs for the missing or lost data on a per channel basis.

12.7 DATA RETENTION BY CONTRACTOR

The contractor shall retain at no extra cost to the agency, reproducible copies of all data tapes or diskettes (analog and digital), 16 mm movie films, and still photograph negatives and test reports.

13. REPORTS

13.1 MONTHLY STATUS REPORTS

The contractor shall submit a monthly Test Status Report and a Vehicle or Equipment Status Report to the COTR on the first Friday of every month. The Vehicle or Equipment Status Report shall be submitted until all vehicles or items of equipment are disposed of. Samples of the required Monthly Status Reports are contained below and on the following page.

MONTHLY TEST STATUS REPORT
FMVSS No. 214, SIDE IMPACT PROTECTION
DATE OF REPORT: _____

VEHICLE NHTSA No., MAKE & MODEL	COMPLIANCE TEST DATE	PASS/ FAIL	DATE REPORT SUBMITTED	DATE INVOICE SUBMITTED	INVOICE PAYMENT DATE
01_____	_____	____	_____	_____	_____
02_____	_____	____	_____	_____	_____
03_____	_____	____	_____	_____	_____
04_____	_____	____	_____	_____	_____
05_____	_____	____	_____	_____	_____
06_____	_____	____	_____	_____	_____
07_____	_____	____	_____	_____	_____
08_____	_____	____	_____	_____	_____
09_____	_____	____	_____	_____	_____
10_____	_____	____	_____	_____	_____
11_____	_____	____	_____	_____	_____
12_____	_____	____	_____	_____	_____
13_____	_____	____	_____	_____	_____
14_____	_____	____	_____	_____	_____
15_____	_____	____	_____	_____	_____
16_____	_____	____	_____	_____	_____
17_____	_____	____	_____	_____	_____
18_____	_____	____	_____	_____	_____
19_____	_____	____	_____	_____	_____
20_____	_____	____	_____	_____	_____

13. REPORTS....Continued

MONTHLY VEHICLE STATUS REPORT
FMVSS No. 214, SIDE IMPACT PROTECTION
DATE OF REPORT: _____

VEHICLE NHTSA No., MAKE & MODEL	DATE OF DELIVERY	ODOMETER READING	TEST COMPLETE DATE	VEHICLE SHIPMENT DATE	ODOMETER READING
01					
02					
03					
04					
05					
06					
07					
08					
09					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					

13. REPORTS....Continued

13.2 LABORATORY NOTICE OF TEST FAILURE TO OCWS REPORT

Any indication of a test failure (i.e. not meeting FMVSS No. 214D performance requirements) shall be communicated by telephone to the COTR within 24 hours with written notification mailed within 48 hours (Saturdays and Sundays excluded). A Notice of Test Failure (see example below) with a copy of the test data sheet(s) and preliminary data plot(s) shall be included.

LABORATORY NOTICE OF TEST FAILURE TO OCWS REPORT
NCAP SIDE IMPACT TEST
TEST DATE: _____

LABORATORY:_____ CONTRACT NO.: _____

_____ DELV. ORDER NO.: _____

LABORATORY PROJECT ENGINEER'S NAME: _____

TEST VEHICLE MODEL YEAR/MAKE/MODEL:

VEHICLE BODY STYLE: _____ BUILD DATE: _____

VEHICLE NHTSA NO.: _____ VIN: _____

DRIVER SID #: _____ PASS. SID #: _____ IMPACT FACE ID #: _____

TEST FAILURE DESCRIPTION:

S214 REQUIREMENT OF THE FMVSS NO. 214D:

NOTIFICATION TO NHTSA (COTR):

SAFETY CONCERN ITEMS: (e.g., door opened or unlatched, fuel leak, high HIC or TTI, etc)

DATE: _____ BY: _____

REMARKS:

13. REPORTS....Continued

13.3 FINAL TEST REPORTS

A. COPIES

Contractors are required to submit the first Final Test Report in draft form within two weeks after the test is conducted. The contractor and the COTR will then be able to discuss the details of both test conduct and report content early in the test program.

Contractors are required to PROOF READ all Final Test Reports before submittal to the COTR. The OCWS will **not** act as a report quality control office for contractors.

Reports containing a significant number of errors will be returned to the contractor for correction, and a "hold" will be placed on invoice payment for the particular test.

Eight (8) CD's per test. Please add two items to the CD's. Place a JPG of the vehicle impact – 180 by 300 pixels and around 10 KB. For the second item, place an impact video to the CD.

One paper copy of each Final Test Report.

FIVE copies of the 16mm films.

ONE disk in Microsoft Word format of the text and data sheet portion of the test report.

ONE copy of the data tape/diskette

B. REQUIREMENTS

The Final Test Report, associated documentation (including glossy color photographs and 16mm movie film) are relied upon as the chronicle of the test. The Final Test Report will be released to the public domain after review and acceptance by the COTR. For these reasons, each final report must be a complete document capable of standing by itself.

The contractor should use detailed descriptions of all test events. Any events that are associated with the pass/fail of FMVSS 214D and that are of technical interest should also be included. The contractor should include as much detail as possible in the report.

Instructions for the preparation of the first three pages of the final test report are provided on the following pages for the purpose of standardization.

13. REPORTS....Continued

C. FIRST THREE PAGES

(1) Front Cover--A heavy paperback cover (or transparency) shall be provided for the protection of the final report. The information required on the cover is as follows:

(a) Final Report Number such as NCAP-ABC-0X-001 where

NCAP	is the NCAP Side Impact Test
ABC	are the initials for the laboratory
0X	is the Fiscal Year of the test program
001	is the Group Number (001 for the 1st test, 002 for the 2nd test, etc.)

(b) Final Report Title And Subtitle such as

NEW CAR ASSESSMENT PROGRAM
SIDE IMPACT TEST
CAR IDENTIFICATION (MY, MAKE, MODEL)
****
World Motors Corporation
2002 Ace Super 4-door sedan
NHTSA No. CS0401

(c) Contractor's Name and Address such as

ABC LABORATORIES
405 Main Street
Detroit, MI 48070

NOTE: DOT SYMBOL WILL BE PLACED BETWEEN ITEMS (c) AND (d)

(d) Date of Final Report completion

(e) The words "FINAL REPORT"

(f) The sponsoring agency's name and address as follows

U. S. DEPARTMENT OF TRANSPORTATION
National Highway Traffic Safety Administration
Safety Performance Standards
Office of Crashworthiness Standards
400 Seventh Street, SW
Room 5313 (NPS -10)
Washington, DC 20590

13. REPORTS....Continued

(2) First Page After Front Cover--A disclaimer statement and an acceptance signature block for the COTR shall be provided as follows:

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Prepared By: _____

Approved By: _____

Approval Date: _____

FINAL REPORT ACCEPTANCE BY OCWS:

Accepted By: _____

Acceptance Date: _____

13. REPORTS....Continued

(3) Second Page After Front Cover--A completed Technical Report Documentation Page (Form DOT F1700.7) shall be completed for those items that are applicable with the other spaces left blank. Sample data for the applicable block numbers of the title page follows.

Block No. 1--REPORT NO.

NCAP-ABC-0X-001

Block No. 2--GOVERNMENT ACCESSION NO. Leave blank

Block No. 3--RECIPIENT'S CATALOG NO. Leave blank

Block No. 4--TITLE AND SUBTITLE

Final Report of New Car Assessment Program
Side Impact Testing of 2002 Ace Super Sedan,
NHTSA No. CS0401

Block No. 5--REPORT DATE

March 1, 200X

Block No. 6--PERFORMING ORGANIZATION CODE

ABC

Block No. 7--AUTHOR(S)

John Smith, Project Manager
Bill Doe, Project Engineer

Block No. 8--PERFORMING ORGANIZATION REPORT NO.

ABC-DOT-XXX-001

Block No. 9--PERFORMING ORGANIZATION NAME AND ADDRESS

ABC Laboratories
405 Main Street
Detroit, MI 48070

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DTNH22-0X-D-12345

13. REPORTS....Continued

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US Department of Transportation
National Highway Traffic Safety Administration
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400 Seventh Street, SW, Room 5313
Washington, DC 20590

Block No. 13--TYPE OF REPORT AND PERIOD COVERED

Final Test Report
Feb. 15 to Mar. 15, 200X

Block No. 14--SPONSORING AGENCY CODE

NPS -10

Block No. 15--SUPPLEMENTARY NOTES Leave blank

Block No. 16--ABSTRACT

A 55/28 kph 90° Moving Deformable Barrier NCAP Side Impact Test was conducted on the subject 2002 Ace Super 4-door sedan in accordance with the specifications of the Office of Crashworthiness Standards Test Procedure for the generation of consumer information on vehicle side crash protection. The test was conducted at the ABC Laboratories facility in Detroit, Michigan, on November 15, 200X.

The impact velocity of the Moving Deformable Barrier (MDB) was 61.9 kph, and the ambient temperature at the struck side (driver's) of the target vehicle at the time of impact was 28°C. The target vehicle post test maximum crush was 250 mm at level 3. The test vehicle's performance follows:

	DRIVER	PASS.
Left Upper Rib (LUR) Accel., g	99	59
Left Lower Rib (LLR) Accel., g	94	97
Lower Spine (T_{12}) Accel., g	61	69
Thoracic Trauma Index (TTI)	80	83
Pelvis (PEV) Accel., g	99	97

The two doors on the struck side of the vehicle did not separate from the body at the hinges or latches and the opposite doors did not open during side impact event.

13. REPORTS....Continued

Block No. 17--KEY WORDS

New Car Assessment Program (NCAP)
Side Impact
MDB
Side Impact Dummy (SID)

Block No. 18--DISTRIBUTION STATEMENT

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Block No. 20--SECURITY CLASSIFICATION OF PAGE

Unclassified

Block No. 21--NO. OF PAGES

Add appropriate number

Block No. 22--PRICE Leave blank

D. TABLE OF CONTENTS..... **Page No.**

Final test report Table Of Contents shall include the following:

Section 1 - Purpose of Impact Test

Section 2 - Test Data Summary

Section 3 - Side Impact Dummy (SID) and Vehicle Test Data

Section 4 - Occupant and Vehicle Information

Appendix A - Photographs

Appendix B - Vehicle and SID Response Data

Appendix C - SID Configuration and Performance Verification Data

Appendix D - Test Equipment List and Calibration Information

13. REPORTS....Continued

Section 1 - <u>PURPOSE AND TEST PROCEDURE</u>

This section briefly outlines the purpose for conducting the side impact test and states the appropriate test procedure followed during the test. The following is provided as an example.

This side impact test is part of the FY____ New Car Assessment Program Side Impact Test Program, sponsored by the National Highway Traffic Safety Administration (NHTSA), under contract No. ___. The purpose of this test was to generate comparative side impact performance in a (description of vehicle being tested). The side impact test was conducted in accordance with the Office of Crashworthiness Standard's Laboratory Test Procedure dated November 2002.

NOTE: This section should be double-spaced and requires an entire separate page.

Section 2 - <u>SUMMARY OF SIDE IMPACT TEST</u>

This section gives a summary of the side impact event. The following is **<u>Typical</u>** and **<u>Acceptable</u>** example of the content needed in this section.

A 200X Ace Super 4-door sedan was impacted on the left or driver's side by a Moving Deformable Barrier (MDB) which was moving forward in a 27° crabbed position to the tow road guidance system at a velocity of _____ kph (___ mph). The target vehicle was stationary and was positioned at an angle of 63° to the line of forward motion. The side impact test was conducted by the ABC Laboratories in Detroit, Michigan, on November 15, 200X. Pretest and post test photographs of the test vehicle, the MDB and the side impact dummies (SIDs) are included in this report.

Two Dummies were placed in the driver and left rear designated seating positions according to instructions specified in the OCWS Side Impact Laboratory Test Procedure which is dated _____. The side impact event was documented by ___ cameras. Camera locations and other pertinent camera information are included in this report.

The Dummies were instrumented with the following accelerometers:

1. *Left Upper Rib (LUR) uniaxial accelerometer (Y-direction)*
2. *Left Lower Rib (LLR) uniaxial accelerometer (Y-direction)*
3. *Lower Thoracic Spine (T_{12}) uniaxial accelerometer (Y-direction)*
4. *Pelvic (PEV) section uniaxial accelerometer (Y-direction)*
5. *Head accelerometers and neck load cells where applicable.*

A summary of the Dummy configuration and performance verification test data has been included in this report along with the dummy response traces. **The driver door became unlatched and open during impact. The fuel line was broken upon impact and fuel was leaking at a rate of 30 oz. Per minute. The side air bag of the driver failed to deploy. The side air bag of the rear seat passenger (behind the driver) was deployed late, and thus failed to provide adequate cushioning for the occupant. The HIC values for both the driver and passenger exceed the threshold. The driver HIC was 1200, and passenger HIC was 1500.**

13. REPORTS....Continued

The following tables summarize the results of the test.

Injury Criteria	Front Dummy	Rear Dummy
TTI (g)		
Pelvic (g)		

Insert Head and Neck Injury Criteria tables when applicable

Head Injury Criteria

Injury Criteria	HIC	T1 (sec)	T2 (sec)	AVG. ACCEL. T1-T2
Front Dummy				
Rear Dummy				

*HIC is as defined in FMVSS 208. The maximum time interval from T1 to T2 is 36 milliseconds

Neck Injury Criteria (as needed)

Maximum Values	Driver Dummy	Rear Dummy
Neck Load X (Newtons)		
Neck Load Y		
Neck Load Z		
Neck Moment X (Newton Meters)		
Neck Moment Y		
Neck Moment Z		

13. REPORTS....Continued

Section 3 - <u>VEHICLE TEST DATA</u>

This section requires the reporting of all information found in the following Data Sheets:

A. Data Sheet No. 1 - General Vehicle Test Parameter Data

B. Data Sheet No. 2 - Test Vehicle Summary of Results

C. Data Sheet No. 3 - Moving Deformable Barrier (MDB) Summary of Results

D. Data Sheet No. 4 - Post Test Observations

Section 4 - <u>OCCUPANT and VEHICLE INFORMATION</u>

This section requires the Data Sheets and Graphs listed below:

E. Data Sheet No. 5 - Dummy Instrumentation Data

F. Data Sheet No. 6 - Vehicle Pre- and Post Test Vehicle Measurements

G. Data Sheet No. 7 - Dummy Longitudinal Clearance Dimensions

H. Data Sheet No. 8 - Dummy Lateral Clearance Dimensions

I. Data Sheet No. 9 - Vehicle Side Measurements

J. Data Sheet No. 10 - Vehicle Exterior Crush Profiles - All Levels

K. Data Sheet No. 11 - Vehicle Damage Profile Distances

L. Data Sheet No. 12 - Exterior Static Crush for Impactor Face

M. Data Sheet No. 13 - Test Vehicle Accelerometer Location and Data Summary

N. Data Sheet No. 14 - MDB Accelerometer Location and Data Summary

O. Data Sheet No. 15 - High Speed Camera Locations and Data

13. REPORTS....Continued

Appendix A - Photographs

The following photographs shall be included in this appendix:

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2	Post Test Frontal View of Test Vehicle	A-2
3	Pretest Rear View of Test Vehicle	A-3
4	Post Test Rear View of Test Vehicle	..
5	Pretest Impacted Side View of Test Vehicle	..
6	Post Test Impacted Side View of Test Vehicle	..
7	Pretest Frontal View of Impactor Face	..
8	Post Test Frontal View of Impactor Face	..
9	Pretest Left Side View of Impactor Face	..
10	Post Test Left Side View of Impactor Face	..
11	Pretest Right Side View of Impactor Face	..
12	Post Test Right Side View of Impactor Face	..
13	Pretest Top View of Impactor Face	..
14	Post Test Top View of Impactor Face	..
15	Pretest Overhead View of MDB Positioned Against Impact Side of Test Vehicle at Impact Location	..
16	Pretest Occupant Compartment View Showing Both Dummies	..
17	Post Test Occupant Compartment View Showing Both Dummies	..
18	Pretest Interior of Front Door	..
19	Post Test Interior of Front Door Showing Dummy Impact Locations	..
20	Pretest Interior of Rear Door	..
21	Post Test Interior of Rear Door Showing Dummy Impact Locations	..
22	Pretest Left Side View of MDB with Impactor Face in position	..
23	Pretest Right Side View of MDB with Impactor Face in position	..
24	Posttest Closeup View of Impact Point Target	..
25	Close-up View of Vehicle’s Certification Label	..
26	Close-up View of Vehicle’s Tire Placard Label	..
27	Post test Overhead View of the MDB and Target Vehicle	..

13. REPORTS....Continued

Appendix B - Vehicle and Dummy Response Data
The following data plots shall be included in this appendix:

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Driver & Passenger Dummy Instrumentation Plots
UNFILTERED DATA (CLASS 1000)

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2	Driver Upper Rib (Y) Velocity vs. Time	B-2
3	Driver Lower Rib (Y) Acceleration vs. Time	B-3
4	Driver Lower Rib (Y) Velocity vs. Time	..
5	Driver Lower Spine (Y) Acceleration vs. Time	..
6	Driver Lower Spine (Y) Velocity vs. Time	..
7	Driver Pelvic (Y) Acceleration vs. Time	..
8	Driver Pelvic (Y) Velocity vs. Time	..
9	Passenger Upper Rib (Y) Acceleration vs. Time	..
10	Passenger Upper Rib (Y) Velocity vs. Time	..
11	Passenger Lower Rib (Y) Acceleration vs. Time	..
12	Passenger Lower Rib (Y) Velocity vs. Time	..
13	Passenger Lower Spine (Y) Acceleration vs. Time	..
14	Passenger Lower Spine (Y) Velocity vs. Time	..
15	Passenger Pelvic (Y) Acceleration vs. Time	..
16	Passenger Pelvic (Y) Velocity vs. Time	..
	Test Vehicle Instrumentation Plots	
17	Right Side Sill at Front Seat (X) Acceleration vs. Time	..
18	Right Side Sill at Front Seat (X) Velocity vs. Time	..
19	Right Side Sill at Front Seat (Y) Acceleration vs. Time	..
20	Right Side Sill at Front Seat (Y) Velocity vs. Time	..
21	Right Side Sill at Front Seat (Z) Acceleration vs. Time	..
22	Right Side Sill at Front Seat (Z) Velocity vs. Time	..
23	Right Side Sill at Rear Seat (X) Acceleration vs. Time	..
24	Right Side Sill at Rear Seat (X) Velocity vs. Time	..

TABLE OF DATA PLOTS
Test Vehicle Instrumentation Plots (con't)

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26	Right Side Sill at Rear Seat (Y) Velocity vs. Time	B-26
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28	Right Side Sill at Rear Seat (Z) Velocity vs. Time	..
29	Rear Floorpan Above Axle (X) Acceleration vs. Time	..
30	Rear Floorpan Above Axle (X) Velocity vs. Time	..
31	Rear Floorpan Above Axle (Y) Acceleration vs. Time	..
32	Rear Floorpan Above Axle (Y) Velocity vs. Time	..
33	Rear Floorpan Above Axle (Z) Acceleration vs. Time	..
34	Rear Floorpan Above Axle (Z) Velocity vs. Time	..
35	Left Side Sill at Front Seat (Y) Acceleration vs. Time	..
36	Left Side Sill at Front Seat (Y) Velocity vs. Time	..
37	Left Side Sill at Front Seat (Y) Displacement vs. Time	..
38	Left Side Sill at Rear Seat (Y) Acceleration vs. Time	..
39	Left Side Sill at Rear Seat (Y) Velocity vs. Time	..
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47	Mid-rear of Left Front Door (Y) Acceleration vs. Time	..
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49	Mid-rear of Left Front Door (Y) Displacement vs. Time	..
50	Left Front Door Upper Centerline (Y) Acceleration vs. Time	..

13. REPORTS....Continued

TABLE OF DATA PLOTS
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56	Left Rear Door Upper Centerline (Y) Acceleration vs. Time	..
57	Left Rear Door Upper Centerline (Y) Velocity vs. Time	..
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59	Lower A-Post (Y) Acceleration vs. Time	..
60	Lower A-Post (Y) Velocity vs. Time	..
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62	Upper A-Post (Y) Velocity vs. Time	..
63	Lower B-Post (Y) Acceleration vs. Time	..
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66	Upper B-Post (Y) Velocity vs. Time	..
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71	Vehicle Center of Gravity (X) Acceleration vs. Time	..
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75	Vehicle Center of Gravity (Z) Acceleration vs. Time	..
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77	MDB Center of Gravity (X) Acceleration vs. Time	..
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13. REPORTS....Continued

MDB Instrumentation Plots

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78	MDB Center of Gravity (X) Velocity vs. Time	B-78
79	MDB Center of Gravity (Y) Acceleration vs. Time	B-79
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82	MDB Center of Gravity (Z) Velocity vs. Time	..
83	MDB Center of Gravity Resultant Acceleration vs. Time	..
84	MDB Rear (X) Acceleration vs. Time	..
85	MDB Rear (X) Velocity vs. Time	..
86	MDB Rear (Y) Acceleration vs. Time	..
87	MDB Rear (Y) Velocity vs. Time	..

Driver & Passenger Dummy Instrumentation Plots (Redundant)

88	Driver Upper Rib (Y) Acceleration vs. Time	..
89	Driver Upper Rib (Y) Velocity vs Time	..
90	Driver Lower Rib (Y) Acceleration vs. Time	..
91	Driver Lower Rib (Y) Velocity vs. Time	..
92	Driver Lower Spine (Y) Acceleration vs. Time	..
93	Driver Lower Spine (Y) Velocity vs. Time	..
94	Driver Pelvic (Y) Acceleration vs. Time	..
95	Driver Pelvic (Y) Velocity vs. Time	..
96	Passenger Upper Rib (Y) Acceleration vs. Time	..
97	Passenger Upper Rib (Y) Velocity vs. Time	..
98	Passenger Lower Rib (Y) Acceleration vs. Time	..
99	Passenger Lower Rib (Y) Velocity vs. Time	..

13. REPORTS....Continued

Driver & Passenger Dummy Instrumentation Plots (con't)
(Redundant)

Plot No.		Page
100	Passenger Lower Spine (Y) Acceleration vs. Time	B-100
101	Passenger Lower Spine (Y) Velocity vs. Time	B-101
102	Passenger Pelvic (Y) Acceleration vs. Time	B-102
103	Passenger Pelvic (Y) Velocity vs. Time	..
104	Driver Upper Rib (Y) Acceleration vs. Time	..
105	Driver Upper Rib (Y) Velocity vs. Time	..
106	Driver Lower Rib (Y) Acceleration vs. Time	..
107	Driver Lower Rib (Y) Velocity vs. Time	..
108	Driver Lower Spine (Y) Acceleration vs. Time	..
109	Driver Lower Spine (Y) Velocity vs. Time	..
110	Driver Pelvic (Y) Acceleration vs. Time	..
111	Driver Pelvic (Y) Velocity vs. Time	..
112	Passenger Upper Rib (Y) Acceleration vs. Time	..
113	Passenger Upper Rib (Y) Velocity vs. Time	..
114	Passenger Lower Rib (Y) Acceleration vs. Time	..
115	Passenger Lower Rib (Y) Velocity vs. Time	..
116	Passenger Lower Spine (Y) Acceleration vs. Time	..
117	Passenger Lower Spine (Y) Velocity vs. Time	..
118	Passenger Pelvic (Y) Acceleration vs. Time	..
119	Passenger Pelvic (Y) Velocity vs. Time	..

13. REPORTS....Continued

Appendix C - Dummy Configuration and Performance Verification Data

SUMMARY
Dummy Pre & Post Test Calibration
(Configured for a [Left / Right] Side Impact)
Date _____

Test Parameter	Specification	Dummy No.		Dummy No.	
		PreTest	Post Test	PreTest	Post Test
SH-Seated Height (mm)	889 - 909				
RH-Rib Height (mm)	501 - 521				
HP-Hip Pivot Height (mm)	99 ref.				
RD- Rib from Back Line (mm)	229 - 241				
KV- Knee Pivot from Back Line (mm)	511 - 526				
SW- Knee Pivot to Floor (mm)	490 - 505				
HW- Hip Width (mm)	356 - 391				
Thorax Impacts					
TEMPERATURE (°C)	18.9 - 25.5				
RELATIVE. HUMIDITY (%)	10 -70				
PROBE SPEED (m/s)	4.21 - 4.33				
UPPER RIB (g's)	37 - 46				
LOWER RIB (g's)	37 - 46				
LOWER SPINE (g's)	15 -22				
Pelvis Impact					
TEMPERATURE (°C)	18.9 - 25.5				
RELATIVE HUMIDITY (%)	10 - 70				
PROBE SPEED (m/s)	4.21 - 4.33				
PELVIS (g's)	40 -60				

13. REPORTS....Continued

CALIBRATION TEST RESULTS SUMMARY

Date: _____
Dummy Number: _____

TEST	COMMENTS
External Dimensions	
Thoracic Shock Absorber Test	
Lateral Thorax Impact Test	
Lateral Pelvis Impact Test	
Abdominal Compression Test	
Lumbar Flexion Test	

ABDOMINAL COMPRESSION TEST

Date: _____
Dummy Number: _____

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE (°C)	**18.9 -25.5**	
RELATIVE HUMIDITY (%)	**10-70**	
FORCE @ 13mm (N)	**104 - 162**	
FORCE @ 19mm (N)	**163 - 221**	
FORCE @ 25mm (N)	**222 - 280**	
FORCE @ 33mm (N)	**325 - 391**	

13. REPORTS....Continued

LUMBAR FLEXION TEST

Date: _____
Dummy Number: _____

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE (°C)	**18.9 -25.5**	
RELATIVE HUMIDITY (%)	**10-70**	
FORCE @ 0° (N)	**0 - 26.7**	
FORCE @ 20° (N)	**97.8 - 151.2**	
FORCE @ 30° (N)	**151.2 - 204.6**	
FORCE @ 40° (N)	**204.6 -258**	
RETURN ANGLE	**12° maximum**	

THORACIC SHOCK ABSORBER TESTS

Date: _____
Dummy Number: _____
DAMPER IDENTIFICATION: _____

TEST PARAMETER		SPECIFICATION	TEST RESULTS
TEMPERATURE (°C)		**18.9 -25.5**	
RELATIVE HUMIDITY (%)		**10-70**	
VELOCITY	**FORCE (N)**	**836 - 1125**	
3 m/s	**DISPLACEMENT (mm)**	**30 - 35**	
VELOCITY	**FORCE (N)**	**1730 - 2099**	
4.3 m/s	**DISPLACEMENT (mm)**	**32 - 37**	
VELOCITY	**FORCE (N)**	**3741 - 4448**	
6.1 m/s	**DISPLACEMENT (mm)**	**33 - 40**	

DAMPER SETTING:

13. REPORTS....Continued

EXTERNAL DIMENSIONS
CONFIGURED FOR [LEFT / RIGHT] SIDE IMPACT

Date: _____
Dummy Number: _____

TEST PARAMETER	SPECIFICATION	TEST RESULTS
SH-Seated Height (mm)	**889 - 909**	
RH-Rib Height (mm)	**502 - 520**	
HP-Hip Pivot Height (mm)	**99 ref.**	
RD- Rib from Back Line (mm)	**229 - 241**	
KH- Knee Pivot from Back Line (mm)	**511 - 526**	
KV- Knee Pivot to Floor (mm)	**490 - 505**	
HW- Hip Width (mm)	**356 - 391**	

LATERAL THORAX IMPACT TEST
CONFIGURED FOR [LEFT/RIGHT] SIDE IMPACT

Date: _____
Dummy Number: _____

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE (°C)	**18.9 -25.5**	
RELATIVE. HUMIDITY (%)	**10 -70**	
PROBE SPEED (m/s)	**4.21 - 4.33**	
UPPER RIB (g's)	**37 - 46**	
LOWER RIB (g's)	**37 - 46**	
LOWER SPINE (g's)	**15 -22**	

13. REPORTS....Continued

LATERAL PELVIS IMPACT TEST
CONFIGURED FOR [LEFT/RIGHT] SIDE IMPACT

Date: _____
Dummy Number: _____

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE (°C)	**18.9 -25.5**	
RELATIVE. HUMIDITY (%)	**10 -70**	
PROBE SPEED (m/s)	**4.21 - 4.33**	
PELVIS ACCELERATION (g's)	**40 -60**	

POST-TEST DUMMY INSPECTION LIST

Date: _____
Dummy Number: _____

PART	ITEMS CHECKED	COMMENTS
SKIN	**VISUAL INSPECTION**	
HEAD	**VISUAL, BALLAST, ACCELEROMETER MOUNT**	
NECK	**VISUAL, CABLE TORQUE**	
SPINE BOX	**VISUAL, BALLAST, WELDMENT, ACCELEROMETER MOUNT**	
RIB CAGE	**VISUAL, MEASURE, STIFFENERS**	
STERNUM	**VISUAL**	
LUMBAR SPINE	**VISUAL**	
ABDOMEN	**VISUAL**	
PELVIS	**VISUAL, PALPATE, ACCELEROMETER MOUNT**	
UPPER LEGS	**VISUAL**	
KNEES	**VISUAL, STOPS, INSERTS**	
LOWER LEGS	**VISUAL, RANGE OF MOTION**	
ANKLES	**VISUAL, RANGE OF MOTION**	
FEET	**VISUAL, RANGE OF MOTION**	
JOINTS	**1 TO 2 g RANGE**	
OTHER		

13. REPORTS....Continued

Appendix D - Test Equipment List and Calibration Information

INSTRUMENTATION FOR DRIVER DUMMY

	DRIVER		
	SERIAL NUMBER	**MANUFACTURER**	**CALIBRATION DATE**
UPPER RIB			
LOWER RIB			
LOWER SPINE			
PELVIS			
UPPER RIB REDUNDANT			
LOWER RIB REDUNDANT			
LOWER SPINE REDUNDANT			
PELVIS REDUNDANT			

INSTRUMENTATION FOR PASSENGER DUMMY

	PASSENGER		
	SERIAL NUMBER	**MANUFACTURER**	**CALIBRATION DATE**
UPPER RIB			
LOWER RIB			
LOWER SPINE			
PELVIS			
UPPER RIB REDUNDANT			
LOWER RIB REDUNDANT			
LOWER SPINE REDUNDANT			
PELVIS REDUNDANT			

13. REPORTS....Continued

VEHICLE AND MDB INSTRUMENTATION

	VEHICLE AND MDB INSTRUMENTS		
	SERIAL NUMBER	**MANUFACTURER**	**CALIBRATION DATE**
MDB CG (X)			
MDB CG (Y)			
MDB CG (Z)			
MDB REAR AXLE (X)			
MDB REAR AXLE (Y)			
LOWER LEFT A-PILLAR			
UPPER LEFT A-PILLAR			
LOWER LEFT B- PILLAR			
UPPER LEFT B-PILLAR			
TRUNK CENTERLINE (X)			
TRUNK CENTERLINE (Y)			
TRUNK CENTERLINE (Z)			
DRIVER SEAT TRACK (Y)			
PASSENGER SEAT (TRACK)			
RIGHT FRONT SILL (X)			
RIGHT FRONT SILL (Y)			
RIGHT FRONT SILL (Z)			
RIGHT REAR SILL (X)			
RIGHT REAR SILL (Y)			
RIGHT REAR SILL (Z)			
RIGHT REAR SEAT OCCUPANT COMPARTMENT			
LEFT FRONT SILL (Y)			
LEFT REAR SILL (Y)			
VEHICLE CG (X)			
VEHICLE CG (Y)			
VEHICLE CG (Z)			

14. DATA SHEETS

Data sheets are provided as **tools** to document test data in the Final Test Report format outlined in the previous section. The contractor is not restricted from using other tools or expanding the data sheets provided in this section. Nevertheless, for consistency and uniformity in reporting data, the contractor must present the data in the **order** outlined in section 13.

14. DATA SHEETS....Continued

DATA SHEET NO. 1
GENERAL TEST VEHICLE PARAMETER DATA

TEST VEHICLE INFORMATION

MODEL YEAR/MAKE/MODEL: _____

BODY STYLE/COLOR: _____ VIN: _____

NHTSA NO.: _____ BUILD DATE: _____

ENGINE DATA: ____ cylinders; ____ CID; ____ Liter; ____ cc

Placement ___ longitudinal; or ___ lateral

TRANSMISSION: ___ speed; ___ manual; ___ automatic; ___ overdrive

FINAL DRIVE: ___ rear wheel drive; ___ front wheel drive; ___ four wheel drive

ODOMETER READING: ____ km.

OPTIONS: ___ A/C; ___ pwr. steering; ___ pwr. brakes; ___ pwr. windows

DATA RECORDED FROM VEHICLE'S TIRE PLACARD

TIRE PRESSURE (AT CAPACITY): ____ psi Front; ____ psi Rear

LOAD INDEX & SPEED SYMBOL: _____

TIRE GRADES: _____ treadwear; _____ traction; _____ temperature

RECOMMENDED TIRE SIZE: _____

TIRES ON TEST VEHICLE: _____ Mfr.: _____

VEHICLE CAPACITY DATA

Number of Occupants: ___ front; ___ rear ___ Total

Type of Front Seat(s): ___ buckets; ___ bench; ___ split bench

Type of Front Seat Back: ___ fixed; ___ adjustable with ___ lever or ___ knob

Vehicle Maximum Capacity Loading = ___ kg. (A)

Number of Occupants X 68.04 kg. = ___ kg. (B)

Vehicle Cargo Capacity (A-B) = ___ kg.

TEST VEHICLE DELIVERED WEIGHT WITH MAXIMUM FLUIDS

Right Front = ____ kg. Right Rear = ____ kg.

Left Front = ____ kg. Left Rear = ____ kg.

Total Front = ____ kg. Total Rear = ____ kg.

TOTAL WEIGHT ____ kg.

% of Total wgt. in Front ____ % of Total wgt. in Rear

14. DATA SHEETS....Continued

DATA SHEET NO. 1 (continued)
GENERAL TEST VEHICLE PARAMETER DATA

CALCULATION OF TEST VEHICLE TARGET WEIGHT

Total Test Vehicle Delivered Weight With Maximum Fluids = ____ kg. (A)

Maximum Cargo Carrying Capacity of Test Vehicle = ____ kg. (B)

Weight of Side Impact Dummies (1 or 2 X (instrumented Dummies weight kg.)= ____ kg. (C)

TEST VEHICLE TARGET WEIGHT: = ____kg.(A+B+C)

FULLY LOADED TEST VEHICLE (UDVW+1 or 2 Dummy(ies) + CARGO)

Right Front = _____ kg.	Right Rear = ____ kg.
Left Front = _____ kg.	Left Rear = ____ kg.
Total Front = _____ kg.	Total Rear = ____ kg.

% of Total wgt. in Front _____ % of Total wgt. in Rear _____

TOTAL WEIGHT _____ kg.

AS TESTED WEIGHT OF TEST VEHICLE (1 or 2 Dummy(ies) + CARGO + EQUIPMENT & INSTRUMENTATION)

Right Front = _____ kg.	Right Rear = ____ kg.
Left Front = _____ kg.	Left Rear = ____ kg.
Total Front = _____ kg.	Total Rear = ____ kg.

% of Total wgt. in Front _____ % of Total wgt. in Rear _____

TOTAL WEIGHT _____ kg.

TEST VEHICLE ATTITUDE
As Delivered Fully Loaded Ready for Test

_____ mm Right Front	____ mm Right Front	____ mm Right Front
_____ mm Left Front	____ mm Left Front	____ mm Left Front
_____ mm Right Rear	____ mm Right Rear	____ mm Right Rear
_____ mm Left Rear	____ mm Left Rear	____ mm Left Rear

Test Vehicle Wheelbase: ____ mm

C.G. = _____ mm rearward of front wheel centerline

Total Vehicle Length:

Right Side = ____ mm Left Side = ____ mm Centerline = ____ mm

14. DATA SHEETS....Continued

DATA SHEET NO. 1 (continued)
GENERAL TEST VEHICLE PARAMETER DATA

FRONT SEAT CUSHION PLACEMENT

Total Length of Adjustment Travel: ____ mm

Total Number of Adjustment Positions or Detents: ____ mm

FRONT SEAT BACK ADJUSTMENT POSITION

Seat Back Torso Angle = ____ degrees

ADJUSTABLE STEERING COLUMN POSITION

Steering Column Position: _____

WINDOW POSITIONS

Right Front = _____ Right Rear = _____

Left Front = _____ Left Rear = _____

AMOUNT OF STODDARD SOLVENT IN FUEL TANK

____ liters (92% -94% of Useable Capacity)

LOCATION OF IMPACT POINT ON TEST VEHICLE SIDE TO BE IMPACTED

Wheelbase = _____ mm

Impact Point is _____ mm rearward of front axle centerline

Actual Impact Point is _____ mm rearward of front axle centerline

14. DATA SHEETS....Continued

DATA SHEET NO. 2
TEST VEHICLE SUMMARY OF RESULTS

MODEL YEAR/MAKE/MODEL: _____

BODY STYLE: _____ VIN: _____

NHTSA NO.: _____ BUILD DATE: _____TEST DATE: _____

Vehicle Overall Length = _____ mm Vehicle Overall Width = _____ mm

VEHICLE TEST WEIGHT (PRE-TEST)

LEFT FRONT____ kg.	LEFT REAR____ kg.
RIGHT FRONT____ kg.	RIGHT REAR____ kg.
TOTAL FRONT____ kg.	TOTAL REAR____ kg.

TOTAL VEHICLE TEST WEIGHT _____ kg.

Wheelbase = _____ mm

Longitudinal C.G. from center of front axle = _____ mm

Impact Angle with respect to impactor = 90 degrees

IMPACT POINT

Actual Impact Point is _____ mm [rearward or forward] of nominal impact ref. line (Lateral)

Actual Impact Point is _____ mm [above or below] nominal impact point (Vertical)

MAXIMUM EXTERIOR STATIC CRUSH

1. LEVEL 1 (___ mm above ground) = ____ mm
2. LEVEL 2 (___ mm above ground) = ____ mm
3. LEVEL 3 (___ mm above ground) = ____ mm
4. LEVEL 4 (___ mm above ground) = ____ mm
5. LEVEL 5 (___ mm above ground) = ____ mm

Maximum Post Test Intrusion = _____ mm

OCCUPANTS

FRONT DRIVER REAR PASSENGER

Dummy Identification Number_____

Restraint Used: _____

INSTRUMENTATION

Number of Data Channels = _____

Number of Cameras: Onboard = _____ Offboard = _____ Total Cameras =_____

14. DATA SHEETS....Continued

DATA SHEET NO. 3
MOVING DEFORMABLE BARRIER (MDB) SUMMARY OF RESULTS

MDB SPECIFICATIONS

Overall Width of Framework Carriage = ____ mm

Overall Length of MDB = ____ mm (including honeycomb impact face)

Wheelbase of Frame work Carriage (front and rear) = ____ mm

C.G. location (rearward of front axle) = ____ mm

MDB WEIGHT

Left Front____ kg. Left Rear____ kg.

Right Front____ kg. Right Rear____ kg.

Total Front____ kg. Total Rear____ kg.

TOTAL WEIGHT OF MDB = ____ kg.

Impact Angle (MDB centerline to target vehicle centerline) = ____ degrees

Impact Speed = ____ km/hr

MAXIMUM STATIC CRUSH OF HONEYCOMB IMPACT FACE

1.ROW A at center of bumper level = ____ mm

2.ROW B at top of bumper level = ____ mm

3.ROW C at mid level = ____ mm

3.ROW D at top of stack level = ____ mm

INSTRUMENTATION

Number of MDB data channels = _____

14. DATA SHEETS....Continued

DATA SHEET NO. 4
POST TEST OBSERVATIONS

TEST VEHICLE: _____ NHTSA NO.: _____

TEST DUMMY INFORMATION AND CONTACT

Description	Front Seat SID	Read Seat SID
Dummy Types/Serial No.		
Head Contact		
Upper Torso Contact		
Lower Torso Contact		
Left Knee Contact		
Right Knee Contact		

POST TEST DOOR OPENING AND SEAT TRACK INFORMATION

Description	Front	Rear
Left Side Doors	** Please see notes below	** Please see notes below
Right Side Doors	** Please see notes below	** Please see notes below
Hatch and Other Doors	** Please see notes below	** Please see notes below
Seat Movement		
Seat Back Failure		

** Note: description for door opening must be specific with the following three categories: Remained closed and operational, opened/unlatched during the crash, jammed shut. Sometimes the door is jammed and unlatched. If the door cannot be opened, then note the door as jammed shut. If open, measurement must be taken for the width of the door opening (mm).

POST TEST STRUCTURAL OBSERVATIONS

Critical Areas of Performance	
Pillar Performance	
Sill Separation	
Windshield Damage	
Window Damage	
Other Notable Effect	

AIR BAG DEPLEMENT

	Driver	Front Passenger	Rear Passenger
Front Air Bags			
Side Air Bags			
Head Air Bags			

MDB LEFT EDGE IMPACT POINT DATA

Measured Parameter	Units	Requirement	Value
Horizontal Offset	mm	+/- 50	
Vertical Offset	mm	+/- 20	

14. DATA SHEETS....Continued

DATA SHEET NO. 5
Dummies INSTRUMENTATION DATA

TEST VEHICLE: _____ NHTSA NO.: _____

	FRONT Dummy ID#				REAR Dummy ID#			
	Positive		Negative		Positive		Negative	
	max (g)	time (msec)	max (g)	time (msec)	max (g)	time (msec)	max (g)	time (msec)
RIB ACCELERATIONS								
Left Upper Rib (LUR) Y								
Left Lower Rib (LLR) Y								
SPINE ACCELERATIONS								
Lower Lateral Y								
PELVIS ACCELERATIONS								
Lateral Y								

REFERENCE

Positive Direction -Longitudinal (X) = rearward
-Lateral (Y) = to right
-Vertical (Z) = up

Negative Direction -Longitudinal (X) = forward
-Lateral (Y) = to left
-Vertical (Z) = down

14. DATA SHEETS....Continued

DATA SHEET NO. 5 (continued)
Dummies INSTRUMENTATION DATA

Insert Head and Neck Injury Criteria tables when applicable

Head Injury Criteria

Injury Criteria	HIC	T1 (sec)	T2 (sec)	AVG. ACCEL. T1-T2
Front Dummy				
Rear Dummy				

*HIC is as defined in FMVSS 208. The maximum time interval from T1 to T2 is 36 milliseconds

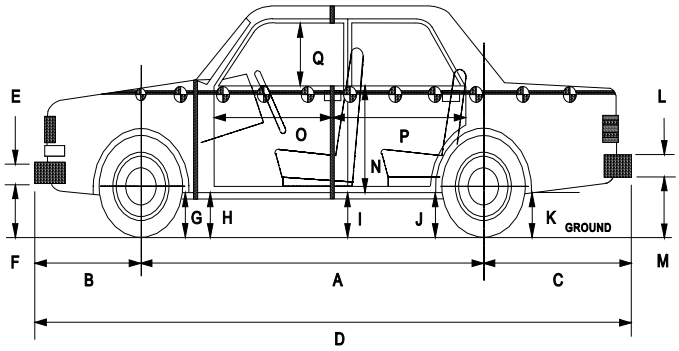
Neck Injury Criteria

MAXIMUM VALUES	DRIVER DUMMY	REAR DUMMY
Neck Load X (Newtons)		
Neck Load Y		
Neck Load Z		
Neck Moment X (Newton Meters)		
Neck Moment Y		
Neck Moment Z		

14. DATA SHEETS....Continued

DATA SHEET NO. 6
VEHICLE PRE- AND POST TEST MEASUREMENTS

TEST VEHICLE: _____ NHTSA NO.: _____



LEFT SIDE VIEW

	PRETEST	POST-TEST	CHANGE
A			
B			
C			
D			
E			
***F**			
***G**			
***H**			
***I**			
***J1/J2**			
***K**			
L			
***M**			
O			
P			
Q			

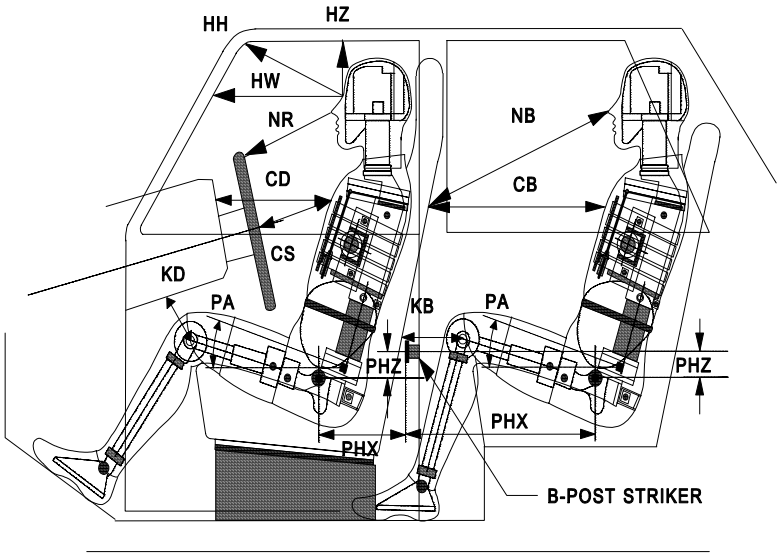
ALL MEASUREMENTS IN MILLIMETERS (mm) WITH TOLERANCE OF ± 3mm
D = Length at Centerline E&L = Bumper thickness J1 = To Pinch Weld
R = Right Side Length S = Left Side Length J2 = To Sill T = Width at B -Post

*** - THESE MEASUREMENTS ARE TO BE TAKEN IN THE "AS DELIVERED" AND IN THE "AS TESTED" CONFIGURATIONS (WHICH INCLUDE DUMMIES, INSTRUMENTATION, CAMERAS, ETC.)**

14. DATA SHEETS....Continued

DATA SHEET NO. 7
DUMMIES LONGITUDINAL CLEARANCE DIMENSIONS

TEST VEHICLE: _____ NHTSA NO.: _____



NOTE: 2-DOOR VEHICLE SHOWN. REAR DUMMY PHX & PHZ MEASUREMENTS FOR A 4-DOOR VEHICLE WOULD USE THE C-POST STRIKER AS A REFERENCE POINT

LEFT SIDE VIEW

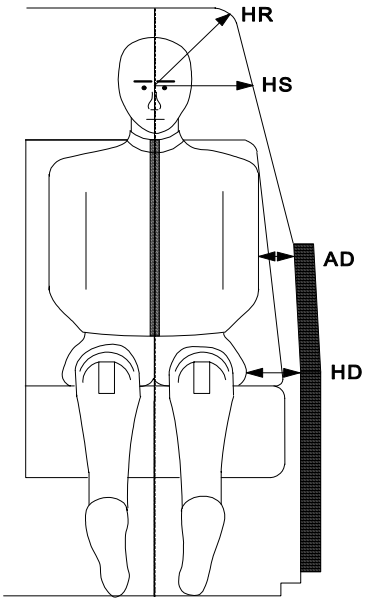
MEASUREMENT (mm)	DRIVER Dummy ID#	PASSENGER Dummy ID#
HH		N/A
HW		N/A
HZ		
NR/NB		
CD/CB		
CS		N/A
NR/NB		
KDL(KDA°)/KBL(KDA°)	\ (°)	\ (°)
KDR(KBA°)/KBR(KBA°)	\ (°)	\ (°)
PA°		
PHX		
PHZ		

ALL MEASUREMENTS IN MILLIMETERS (mm) WITH TOLERANCE OF ± 3mm

14. DATA SHEETS....Continued

DATA SHEET NO. 8
DUMMIES LATERAL CLEARANCE DIMENSIONS

TEST VEHICLE: _____ NHTSA NO.: _____



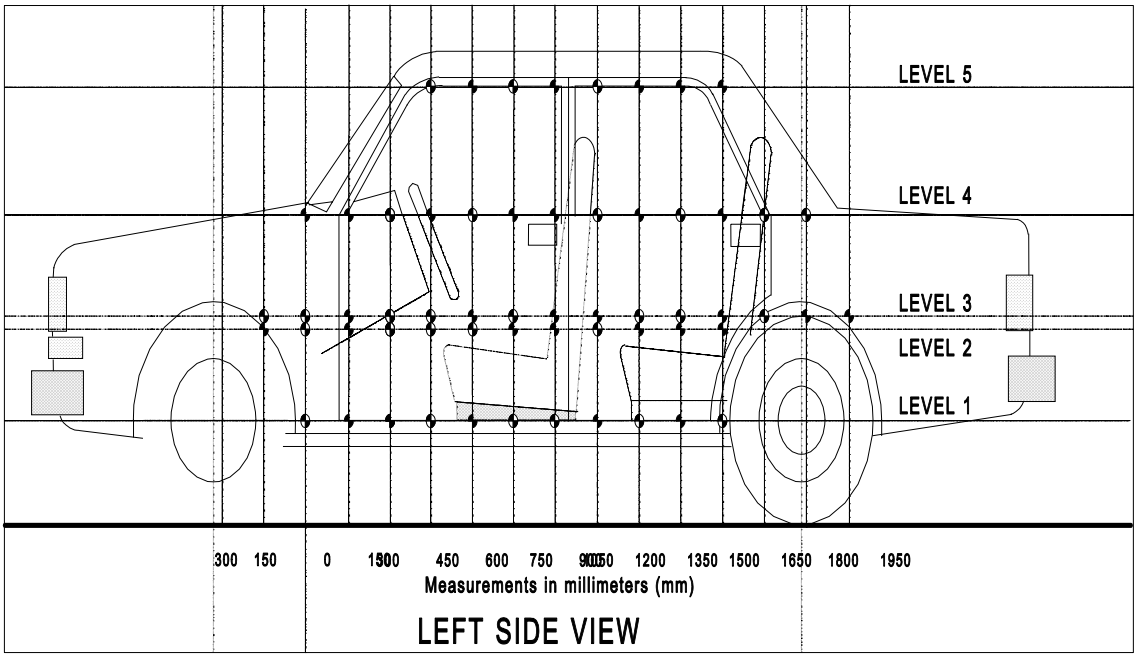
MEASUREMENT(mm)	DRIVER Dummy ID#	PASSENGER Dummy ID#
HR		
HS		
AD		
HD		

ALL MEASUREMENTS IN MILLIMETERS (mm) WITH TOLERANCE OF ± 3mm

14. DATA SHEETS....Continued

DATA SHEET NO. 9
VEHICLE SIDE MEASUREMENTS

TEST VEHICLE: _____ NHTSA NO.: _____



LEVEL 5 - WINDOW TOP
LEVEL 4 - WINDOW SILL
LEVEL 3 - MID-DOOR
LEVEL 2 - OCCUPANT H-POINT
LEVEL 1 - AXLE CENTERLINE HEIGHT or SILL TOP HEIGHT

MEASUREMENTS ARE TAKEN WHEN THE VEHICLE IS IN THE "AS TESTED" CONFIGURATON

MEASUREMENTS ALONG THE VERTICAL 750 mm LINE SHOWN ABOVE

LEVEL 5 @ Window Top = _____ mm

LEVEL 4 @ Window Sill = _____ mm

LEVEL 3 @ Mid Door = _____ mm

LEVEL 2 @ Occupant H-Point = _____ mm

LEVEL 1 @ Axle Centerline Height = _____ mm
(or Sill Top Height)

14. DATA SHEETS....Continued

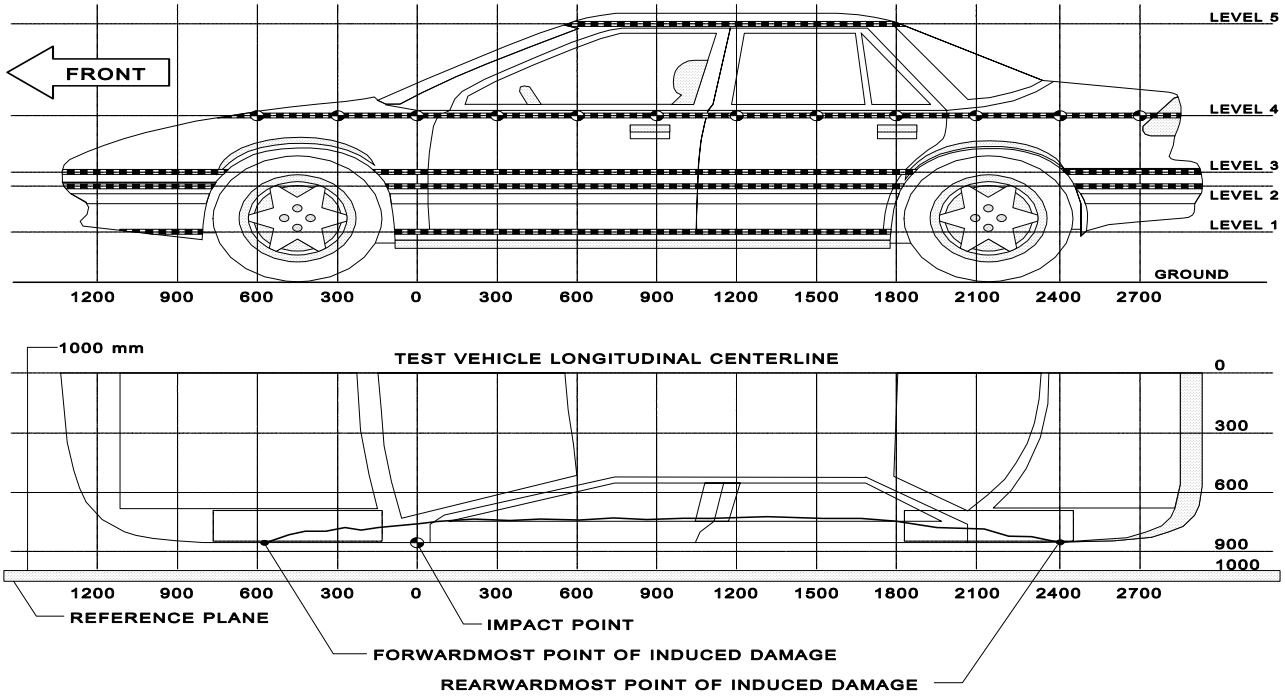
DATA SHEET NO. 10
VEHICLE EXTERIOR CRUSH PROFILES - ALL LEVELS

Note: Due to limited space the following table only indicates measurements from -150 mm to 1800 mm, however, tape should be applied along the entire length of target vehicle and measurements made every 150 mm, across span of induced damage (see graphic on next page). Measurements should be accurate to ± 3 mm.

LOCATION	HEIGHT		(mm) FROM IMPACT POINT													
			- 150	0	150	300	450	600	750	900	1050	1200	1350	1500	1650	1800
LEVEL 1		PRE														
SIDE		POST														
SILL		CRUSH														
LEVEL 2		PRE														
H-		POST														
POINT		CRUSH														
LEVEL 3		PRE														
MID-		POST														
DOOR		CRUSH														
LEVEL 4		PRE														
WINDOW		POST														
SILL		CRUSH														
LEVEL 5		PRE														
WINDOW		POST														
TOP		CRUSH														

14. DATA SHEETS....Continued

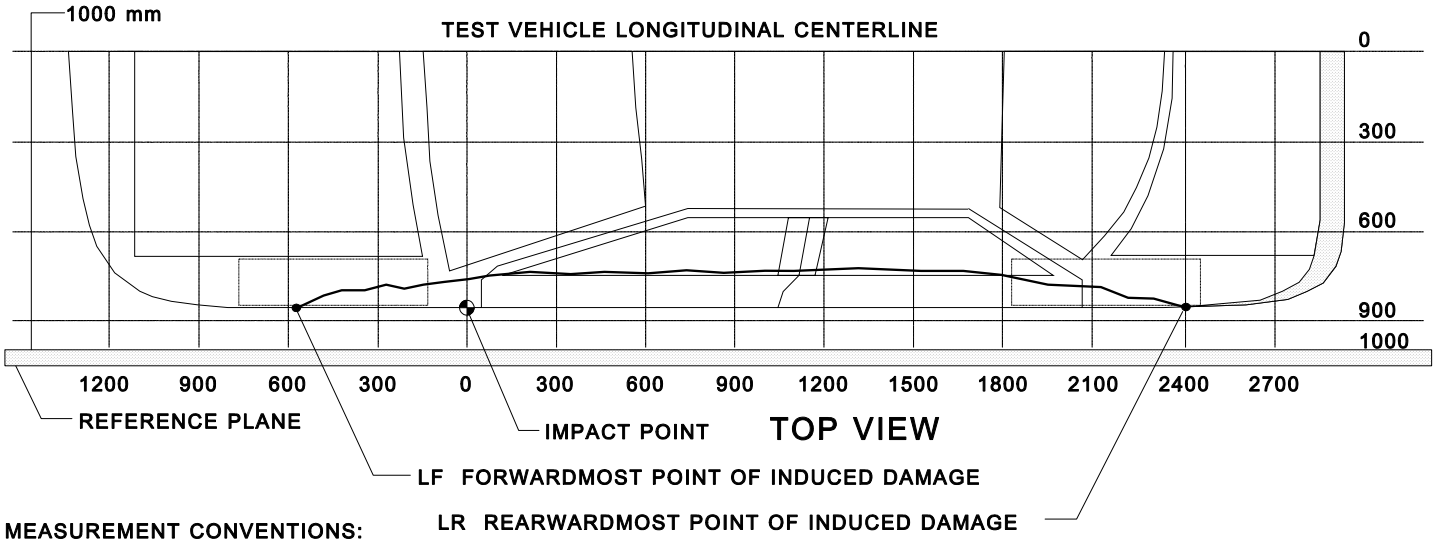
DATA SHEET NO. 10 (continued)



NOTE: All measurements are in millimeters (mm)

DATA SHEET NO. 11
VEHICLE DAMAGE PROFILE DISTANCES

NOTE: All measurements are in millimeters (mm) and should be accurate to 3mm.



MEASUREMENT CONVENTIONS:
Forward of the impact point (towards front of vehicle) is considered negative ().
Rearward of the impact point (toward rearend of vehicle) is considered positive (+).

DPD MEASUREMENTS	POST TEST (mm)	PRETEST (mm)	STATIC CRUSH (mm)
0 (LR = mm)			0.0
			0.0

14. DATA SHEETS....Continued

DATA SHEET NO. 12
EXTERIOR STATIC CRUSH FOR IMPACTOR FACE

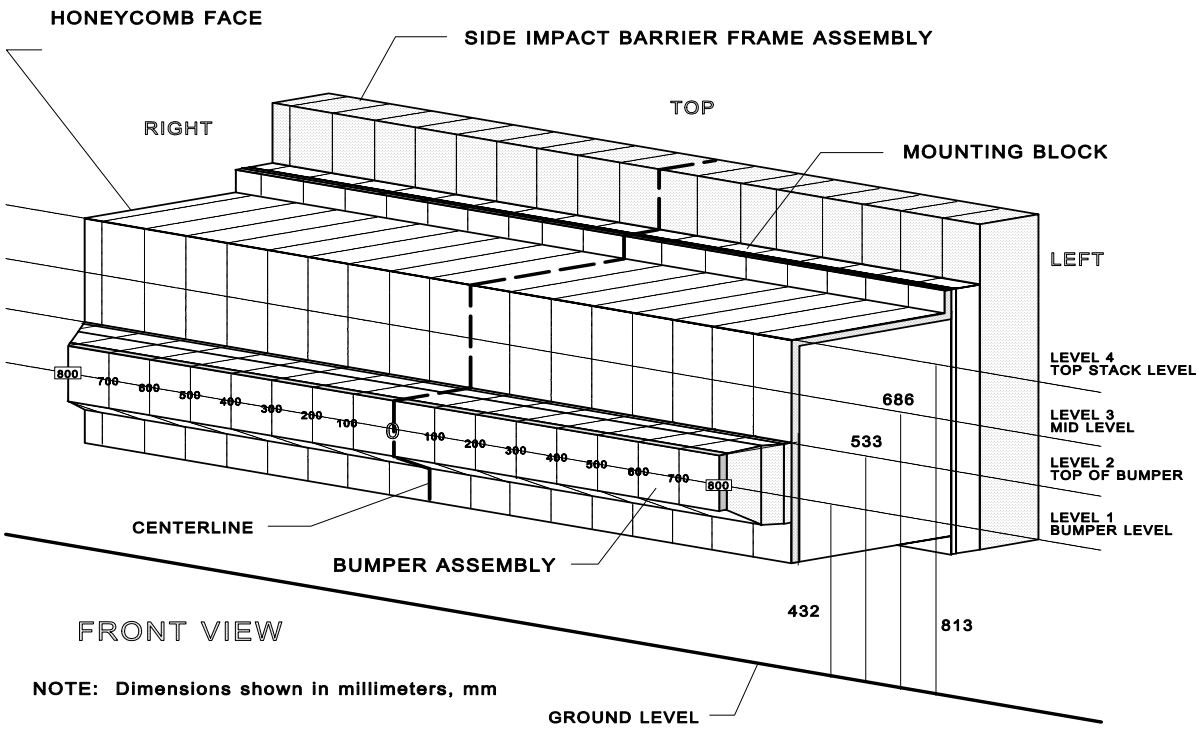
TEST VEHICLE: _____ NHTSA NO.: _____

		Distance Right of Center (mm)									Distance Left of Center (mm)							
LOCATION	**HEIGHT AT CL***	**800**	**700**	**600**	**500**	**400**	**300**	**200**	**100**	**0**	**100**	**200**	**300**	**400**	**500**	**600**	**700**	**800**
Top Stack Level **Level 4**	810mm																	
Mid Level **Level 3**	685mm																	
Top Bumper Level **Level 2**	560mm																	
Mid Bumper Level **Level 1**	432mm																	

All measurements are in millimeters and should have a tolerance of ± 3 mm

See next page for Barrier Face Graphic

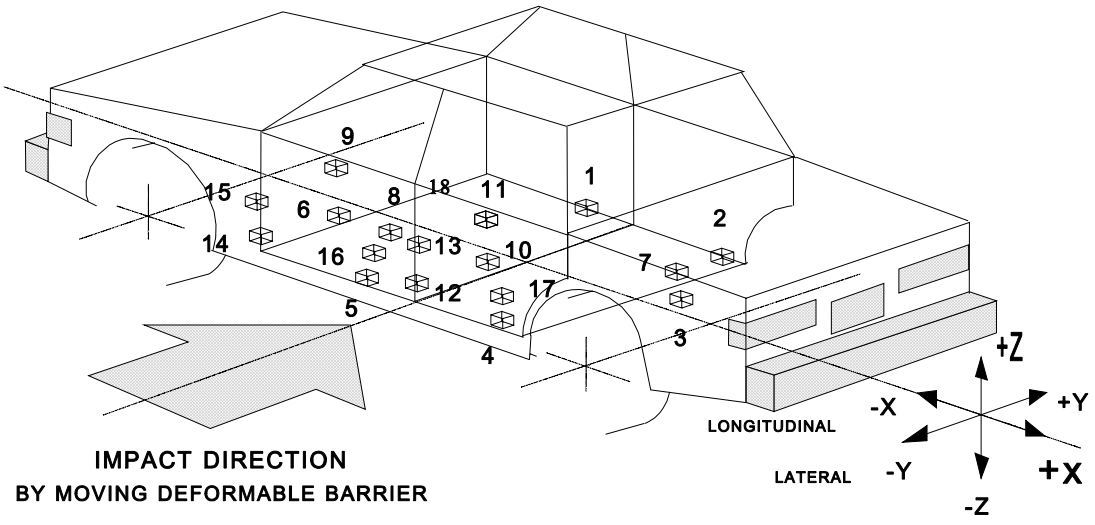
DATA SHEET No. 12 (continued)



14. DATA SHEETS....Continued

DATA SHEET NO. 13
TEST VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

TEST VEHICLE: _____ NHTSA NO.: _____



1-Rt. Side SIII @ Frt Seat
2-Rt. SIde Sill @ Rr. Seat
3-Rr. Floorpan Above Axle
4-Left Side Sill @ Rr. Seat
5-Left Side SIII @ Frt. Seat
6-Left Frt. Door On Centerline
7-Rt. Rr. Occ Compartment
8-Midrear of Left Frt. Door
9-Left Frt. Door Upper Ctrline
10-Midrear of Left Rear Door
11-Left Rear Door Upper Ctrline
12-Left Lower B-Post
13-Left Middle B-Post
14-Left Lower A-Post
15-Left Middle A-Post
16-Front Seat Track
17-Rear Seat Track
18-Vehicle C.G.

14. DATA SHEETS....Continued

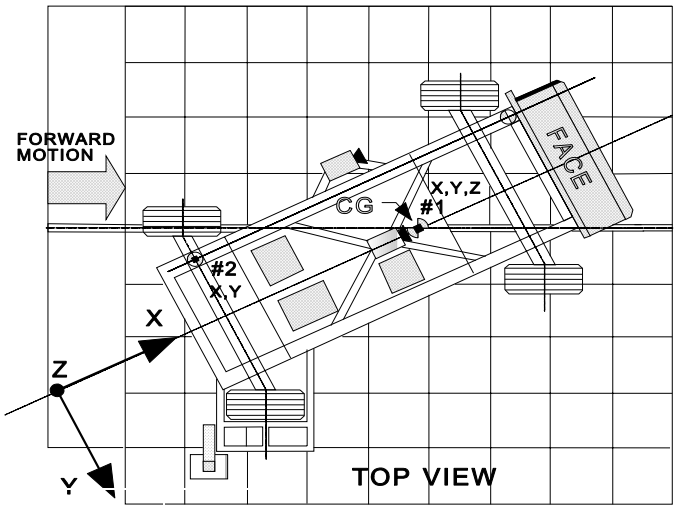
DATA SHEET NO. 13 (continued)
TEST VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

		COORDINATES (mm) ± 3mm				LONG. (X)		LAT. (Y)		VERT. (Z)		RESULTANT	
ACCEL. NO.	LOCATION	X	Y	Z		Max (g)	Time (msec)	Max (g)	Time (msec)	Max (g)	Time (msec)	Max (g)	Time (msec)
1	right front sill at front seat				pos. neg.								
2	right rear sill at rear seat				pos. neg.								
3	rear floor pan above axle				pos. neg.								
4	left side sill at rear seat				pos. neg.								
5	left side sill at front seat				pos. neg.								
6	left front door on centerline				pos. neg.								
7	right rear occupant compartment				pos. neg.								
8	mid-rear of left front door				pos. neg.								
9	left front door upper centerline				pos. neg.								
10	mid-rear of left rear door				pos. neg.								
11	left rear door upper centerline				pos. neg.								
12	left lower B-Post				pos. neg.								
13	left Middle B-Post				pos. neg.								
14	left Lower A-Post				pos. neg.								
15	left Middle A-Post				pos. neg.								
16	front Seat Track				pos. neg.								
17	rear seat track				pos. neg.								
18	vehicle C.G.				pos. neg.								

14. DATA SHEETS....Continued

DATA SHEET NO. 14
MDB ACCELEROMETER LOCATIONS AND DATA SUMMARY

TEST VEHICLE: _____ NHTSA NO.: _____



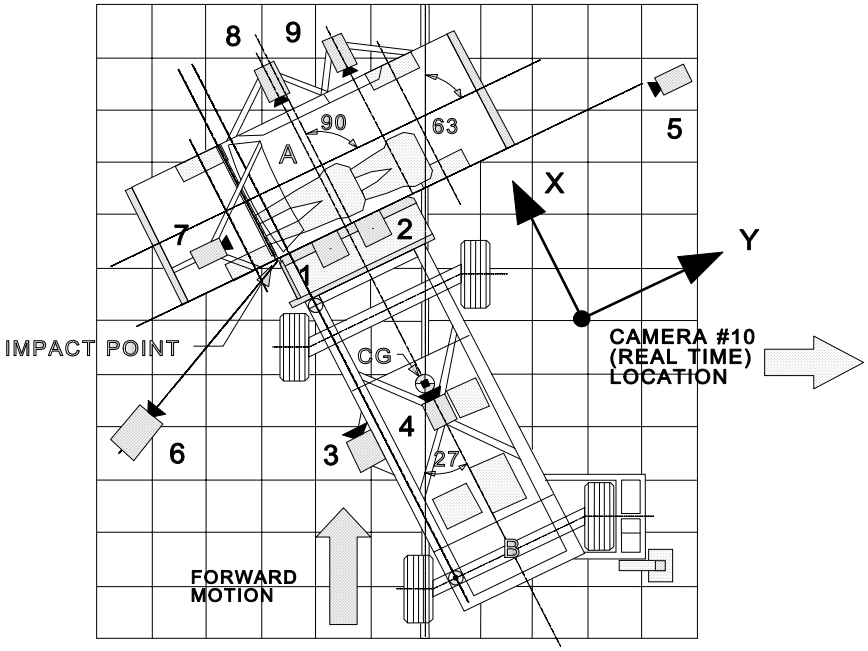
Accel. no.	Coordinates (mm)			Location	(+) Positive		(-) Negative	
	X*	Y*	Z*		max (g)	time (msec)	max (g)	time (msec)
1				MDB Center of Gravity				
				Longitudinal (X)				
				Lateral (Y)				
				Vertical (Z)				
				Resultant (R)				
2				Rear Frame Member				
				Longitudinal (X)				
				Lateral (Y)				

***All measurements accurate to within ± 3 mm.**

Reference: +X = Rearward +Y = To Right +Z = Up

14. DATA SHEETS....Continued

DATA SHEET NO. 15
HIGH SPEED CAMERA LOCATIONS AND DATA



Camera No.	VIEW	Coordinates (mm)			Angle	Lens (mm)	Min.Film speed (fps)
		X*	Y*	Z*			
1	Overhead view of test vehicle						1000
2	Overhead closeup view of impact plane						1000
3	MDB onboard closeup view of Impact point						1000
4	MDB onboard view of driver dummy						1000
5	Right side ground level -- overall view						1000
6	Left side ground level -- overall view						1000
7	Test vehicle onboard driver -- front view						1000
8	Test vehicle onboard driver -- side view						1000
9	Test vehicle onboard passenger -- side view						1000
10	Real-time (24 fps) film coverage of test						24

Reference: (from point of impact) +X = Rearward, +Y = To Right, +Z = Up

* All measurements accurate to ± 6 mm.

15. FORMS

Forms, like Data Sheets, are provided as **tools** to use in the exchange of data between the COTR and the contractor. Forms, unlike Data Sheets, are not **part** of the Final Test Report. The contractor is not restricted from using other tools or expanding the forms outlined in this section.

A. FORM NO. 1 - Vehicle Condition Report

A "Vehicle Condition Report" form (example shown on next page) must be submitted to the COTR with the copies of the Final Test Report. The first page of the form shall be completed when the test vehicle arrives at the testing laboratory. The second page of the form is completed after the test. The forms shall be **legible** (hand written forms are unacceptable) and **complete** (all information requested is filled out).

B. FORM NO. 2 - Test Vehicle Information

A "Test Vehicle Information" form (such as the example shown on the following pages) will be supplied by the COTR to the contractor before testing preparation. Information on this form is supplied by the automobile manufacturer to aid in the initial test set-up and shall be considered as **reference material**. After vehicle preparation is complete, the Test Vehicle Information form shall be discarded.

FORM NO. 1
REPORT OF VEHICLE CONDITION

CONTRACT NO.: DTNH22-_____ DATE: _____

FROM:

TO:

The vehicle was inspected upon arrival at the laboratory for the test and found to contain all the equipment listed below. All variances have been reported within 2 working days of the vehicle arrival, by letter, to the NHTSA Industrial Property Manager (NAD-30), with a copy to the COTR. The vehicle is again inspected, after the above test has been conducted, and all changes are noted below. The final condition of the vehicle is also noted in detail.

MODEL YEAR/MAKE/MODEL/BODY STYLE: _____

NHTSA NO.: _____ BODY COLOR: _____ VIN: _____

ODOMETER READINGS: ARRIVAL - _____ miles DATE _____
COMPLETION - _____ miles DATE _____

PURCHASE PRICE: $ _____ DEALER'S NAME: _____

ENGINE DATA: _____ Cylinders ___ Liters ____ Cubic inches

TRANSMISSION DATA: _____ Automatic ___ Manual ____ No. of speeds

FINAL DRIVE DATA: _____ Rear Drive ___ Front Drive ____ 4 Wheel Drive

TIRE DATA: Size _____ Mfr.

CHECK APPROPRIATE BOXES FOR VEHICLE EQUIPMENT:

	Air Conditioning		Traction Control		Clock
	Tinted Glass		All Wheel Drive		Roof Rack
	Power Steering		Cruise/speed Control		Console
	Power Windows		Rear Window Defroster		Driver Air-bag
	Power Door Locks		Sun Roof or T-Top		Passenger Air-bag
	Power Seat(s)		Tachometer		Front Disc Brakes
	Power brakes		Tilt Steering Wheel		Rear Disc Brakes
	Anti-lock brakes system		AM/FM Cassette Radio		Other

LIST OTHER PERTINENT OPTIONAL EQUIPMENT ON NEXT PAGE (REMARKS SECTION)

REPORT OF VEHICLE CONDITION AT THE COMPLETION OF TESTING

REMARKS:

Equipment that is no longer on the test vehicle as noted on previous page:

Explanation for equipment removal:

Test Vehicle Condition:

RECORDED BY: _____ DATE: _____

APPROVED BY: _____

FORM NO. 2
TEST VEHICLE INFORMATION

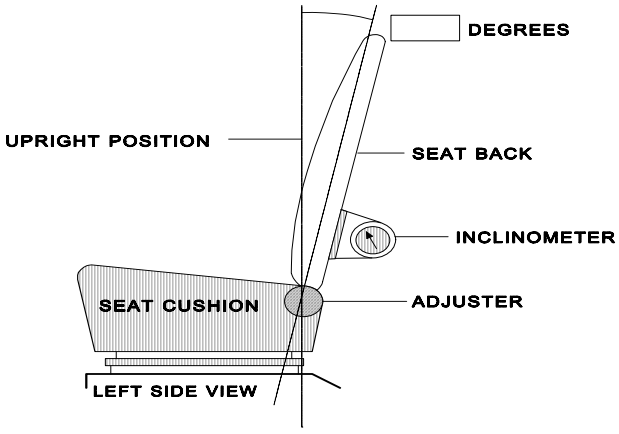
Vehicle Model Year & Make:
Vehicle Model & Body Style:

1. NOMINAL DESIGN RIDING POSITION - -

For adjustable driver and passenger seat backs. Please describe how to position the inclinometer to measure the seat back angle. Include description of the location of the adjustment latch detent if applicable. Indicate, if applicable, how the detents are numbered (Is the first detent "0" or "1"?).

Seat back angle for driver's seat = ___°
Measurement Instructions:

Seat back angle for passenger's seat = ___°
Measurement Instructions:



FRONT SEAT ASSEMBLY

2. SEAT FORE & AFT POSITIONS - -

Provide instructions for positioning the driver and front outboard passenger seat(s) in the center of fore and aft travel. For example, provide information to locate the detent in which the seat track is to be locked.

Positioning of the driver's seat:

Positioning of the passenger's seat (if applicable):

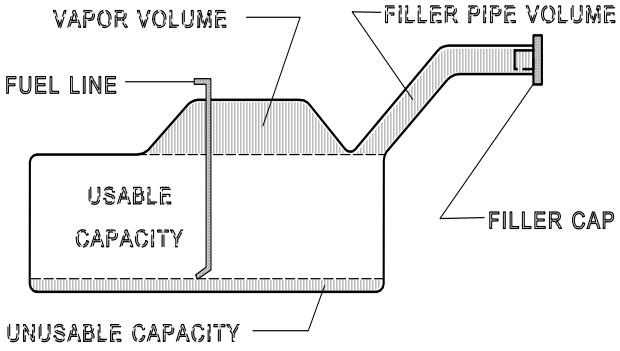
3. FUEL TANK CAPACITY DATA - -

3.1 A. "Usable Capacity" of standard equipment fuel tank = _____ gallons.

B. "Usable Capacity" of optional equipment fuel tank = _____ gallons.

C. "Usable Capacity" of vehicle(s) used for certification testing to requirements of FMVSS 301 = _____ gallons.

Operational Instructions:



VEHICLE FUEL TANK ASSEMBLY

3.2 Amount of Stoddard solvent added to vehicle(s) used for certification test(s) = _____ gallons

3.3 Is vehicle equipped with electric fuel pump?

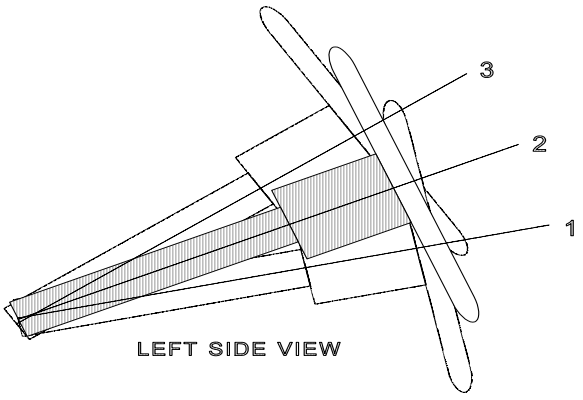
Yes-___; No- _____

If YES, explain the vehicle operating conditions under which the fuel pump will pump fuel.

4. STEERING COLUMN ADJUSTMENTS - -

Steering wheel and column adjustments are made so that the steering wheel hub is at the geometric center of the locus it describes when it is moved through its full range of driving positions.
If the tested vehicle has any of these adjustments, does your company use any specific procedures to determine the geometric center.

Operational Instructions:



STEERING COLUMN ASSEMBLY